

Chapter Forty-six

**STRATEGIC REGIONAL  
ARTERIALS**

(New Construction/Reconstruction)

BUREAU OF DESIGN AND ENVIRONMENT MANUAL



**Chapter Forty-six**  
**STRATEGIC REGIONAL ARTERIALS**  
**(New Construction/Reconstruction)**

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## Chapter Forty-six

# STRATEGIC REGIONAL ARTERIALS (New Construction/Reconstruction)

Strategic Regional Arterials (SRA's) are a network of highways designed to accommodate long-distance regional traffic, to complement a region's major transit and highway facilities, and to supplement the freeway system. The Department's SRA concept was originally developed for Northeastern Illinois and is presented in the IDOT publication *Strategic Regional Arterial Design Concept Report "Operation Green Light."* However, this concept could apply to other cities and regions throughout the State.

Many of the Department's existing arterials can be incorporated into a SRA system. SRA's may have widely varying characteristics. Existing rights-of-way, roadway features, land use, and access differ from route to route, and also may change from one segment of a route to another. Chapter 46 provides guidance in the planning and design of strategic regional arterials including specific design criteria and techniques encountered on SRA routes, which should be applied throughout the system. Information also applicable to SRA's is included in the following chapters:

- Chapters 31, 32, 33, 34, and 39 provide guidance on the geometric design elements that are applicable to SRA's.
- Chapter 36 provides information on the design of intersections including left- and right-turn lanes, channelization, and intersection sight distance.
- Chapter 37 discusses the type, location, and design of interchanges.
- Chapter 38 provides guidelines on roadside safety.

### 46-1 GENERAL

#### 46-1.01 Objectives for a SRA System

The SRA System is designed to:

- improve regional mobility by providing a comprehensive network of arterial routes designed to carry significant volumes of long distance traffic across a region,
- complement a region's major transit and highway facilities by providing access for regional trips on these facilities, and
- supplement the regional freeway system.

**46-1.02    SRA Route Definitions**

Within the overall SRA network, there are significant differences in the roadway environment that determine how the different types of routes (urban, suburban, and rural) may function in the system. The information in Chapter 46 has been segregated accordingly. For SRA application, the following defines the characteristics for these designations:

1.     Urban Routes. Urban areas are defined as those with densities over 5 households per acre (12 households per hectare) in the design year. SRA routes located in densely urbanized areas typically are existing facilities with minimal potential for roadway expansion. However, improvements can be made to intersections, local transit facilities, and low structural clearances.
2.     Suburban Routes. Suburban areas are defined as those with densities between 0.5 to 5 households per acre (1 and 12 households per hectare) in the design year. For routes in developing suburban areas, the major concerns are preservation of right-of-way, additional lanes on roadways, new connections to improve route continuity, and operational improvements (e.g., signal coordination).
3.     Rural Routes. Rural areas are defined as those with densities less than 0.5 households per acre (1 household per hectare) in the design year. In rural areas, the major issues are the preservation of right-of-way and controlled access on bypasses to emphasize the movement of through traffic and the accommodation of future needs.

**46-1.03    Spacing of SRA's**

Spacing of routes on the SRA system is based upon the projected levels of future travel demand within the different parts of a region. In northeastern Illinois, the spacing should range from about 3 miles (5 km) apart in the most densely areas to about 9 miles (15 km) apart in rural areas. Spacing for other parts of the State will be determined on a case-by-case basis.

**46-1.04    Coordination with Local Land Use Plans**

For the SRA system to successfully accomplish its objectives, coordinated planning with each local jurisdiction is necessary along the routes. Local planning and development policies, particularly the arrangement of land uses adjacent to the arterial street and type of access, will greatly affect the ability of the facility to fulfill its function of carrying long-distance traffic. Also right-of-way protection will need to be coordinated with local planning and development agencies. Dedication or preservation of right-of-way on the SRA routes through the local development process is an effective means of protecting needed right-of-way to provide for future roadway improvements. Land use planning techniques can also encourage use of alternative modes of transportation, with policies favorable to mixed-use development.

Because SRA routes create a regional network, the impact of planning and development decisions crosses local boundaries. The need for cooperation among local governments and



regional transportation agencies in coordinating land development with planned SRA improvements is important whether or not a formal framework is established.

#### **46-1.05 SRA Planning**

##### **46-1.05(a) Objectives**

Development of comprehensive, long-range plans for a SRA network is necessary in order to implement a SRA system. These plans will identify both short-range and long-range improvements for each of the SRA routes. The following objectives may be used as a guide in the planning process:

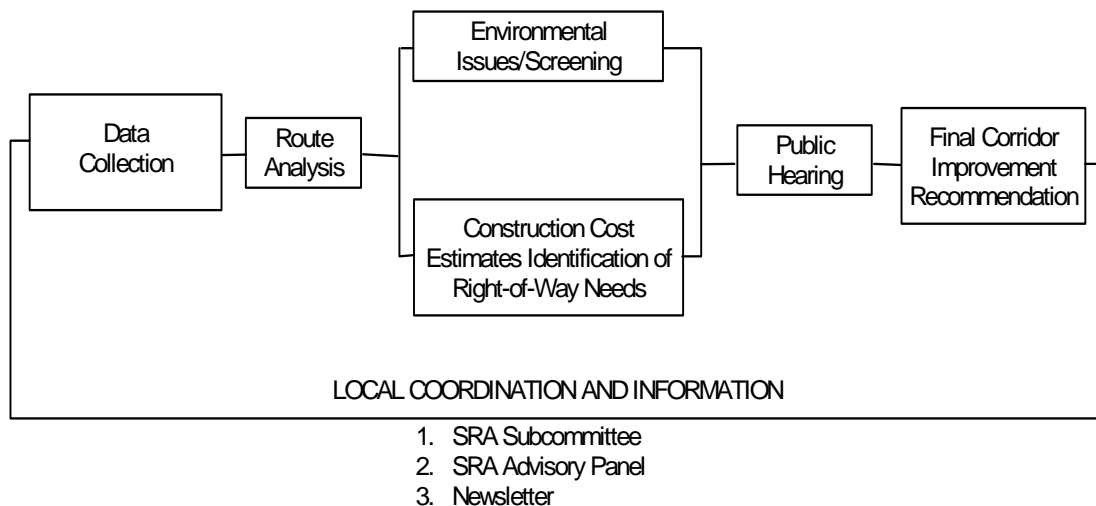
- Determine the types of roadway improvements needed for each route including additional lanes, signalization, and interchanges.
- Identify and protect needed rights-of-way.
- Manage access to SRA routes to improve through traffic movement and reduce conflicts.
- Coordinate land use and development projects with transportation improvements.
- Identify ways to accommodate the growth in commercial traffic.
- Accommodate necessary bicycle and pedestrian travel on or near the SRA route corridors.
- Identify potential environmental concerns.

The long-term plans are intended to be specific to each SRA route. However, this does not preclude consideration during the planning process of alternative segments on a route where warranted by circumstances. Also, the planning process should address the fact that not all transportation needs can be provided within the right-of-way of an SRA route, and that some types of travel may be better provided on parallel facilities.

##### **46-1.05(b) Implementation Process**

The SRA planning process has two parts:

- The first part consists of developing recommended design features and techniques for the SRA route. Chapter 46 provides the criteria that should be considered when developing route specific plans.
- The second part consists of preparing specific route studies for each SRA route. The studies will recommend both comprehensive short-range and long-range improvements for each route, through the work program; see Figure 46-1.A.



## THE SRA ROUTE STUDIES WORK PROGRAM

Figure 46-1.A

The principal activities in the route studies work program are:

1. Data Collection/Evaluation. The SRA planning process is designed to efficiently use available data. For each route, data is assembled from right-of-way information, roadway plans, traffic volume projections, transit information, bicycle usage, adjacent development characteristics, crash data, environmental studies, and other sources, and is analyzed to establish current conditions, constraints, and improvement needs.
2. Route Analysis. Possible improvements for the SRA route are determined by incorporating the recommended design features in specific configurations for each segment of the overall route. These configurations include alternative designs and techniques where necessary to accommodate local conditions or constraints. The timing of the recommended improvements, whether long-range or short-range, are also identified.
3. Environmental Issues/Screening. While the SRA planning process does not include detailed environmental assessments or analysis of specific mitigation measures, a screening process will identify significant environmental conditions along each route. Use the results of this process to evaluate improvement alternatives, and also to serve as an early indicator of environmental issues for future design studies.
4. Construction Cost Estimates/Identification of Right-of-Way Needs. Prepare construction cost estimates for each route segment, both for short-range and long-range improvements. Also identify right-of-way needs to accommodate the recommended long-range improvements.

5. Local Involvement and Coordination. Throughout the SRA route planning process, the involvement of local and regional agencies is an important consideration; see Section 46-1.04. Information and coordination efforts include forming Advisory Panels for each SRA route, which will work with IDOT during the planning process. A regular newsletter for each Panel will inform members about the SRA program and ongoing route studies. A public hearing in an open-house format will also be conducted for each route.
6. Final Route Improvement Plan/Report. As the final step in the planning process, prepare a report for each SRA route to document the recommended improvements and findings.

As planning for each route is completed, the design concepts will be used to help program the scope and timing for improvements along that route. For State routes, once an SRA improvement is included in the IDOT Five-Year Program, the process of implementation follows the process shown in Figure 46-1.B.

<b>Pre-Phase I (SRA Route Studies)</b>	<b>Phase I Reports</b>	<b>Phase II</b>	<b>Phase III</b>	<b>Phase IV</b>
<u>Planning</u> 1. Data Collection 2. Test Alternatives 3. Local Coordination 4. Environmental Screening 5. Recommend Improvements 6. Public Meetings	<u>Preliminary Design</u> 1. Preparation of Preliminary Plans 2. Public Involvement 3. Environmental Studies/Mitigation 4. Public Meetings	<u>Final Design</u> 1. Preparation of Contract Plans 2. Community Coordination 3. Environmental Mitigation	<u>Construction</u> 1. Implementation 2. Community Coordination	<u>Post Construction</u> 1. Environmental Monitoring 2. Land Development/ Access

#### THE SRA IMPLEMENTATION PROCESS FOR ROUTES UNDER IDOT JURISDICTION

Figure 46-1.B



## 46-2 URBAN SRA ROUTES

### 46-2.01 General Roadway Features

Urban SRA's are proposed with two or more lanes in each direction divided by a flush median. Measures to increase mobility will typically be associated with traffic signal systems, changes to access, and removal of parking rather than widening or other new construction. Figure 46-2.A illustrates the typical plan view design configuration for an urban SRA. Figure 46-2.B illustrates a desirable cross section for an urban SRA. For an illustration of a superelevated section, see Chapter 48. Where right-of-way or other restrictions do not allow the configuration in Figure 46-2.A, the designer may consider the following:

1. One-Way Arterial Pairs. One-way arterial pairs can dramatically increase the capacity of a roadway by reducing turning movements and conflicts. The one-way pairs should be within close proximity to each other. This concept is generally feasible in urban areas where right-of-way for increasing capacity is limited and where closely spaced parallel streets are available.
2. Reversible Lanes. In areas where there is substantial commuter traffic and a directional bias to the traffic corresponding to the time of day, reversible lanes may be considered. Lane control signals and other traffic control features will be required.

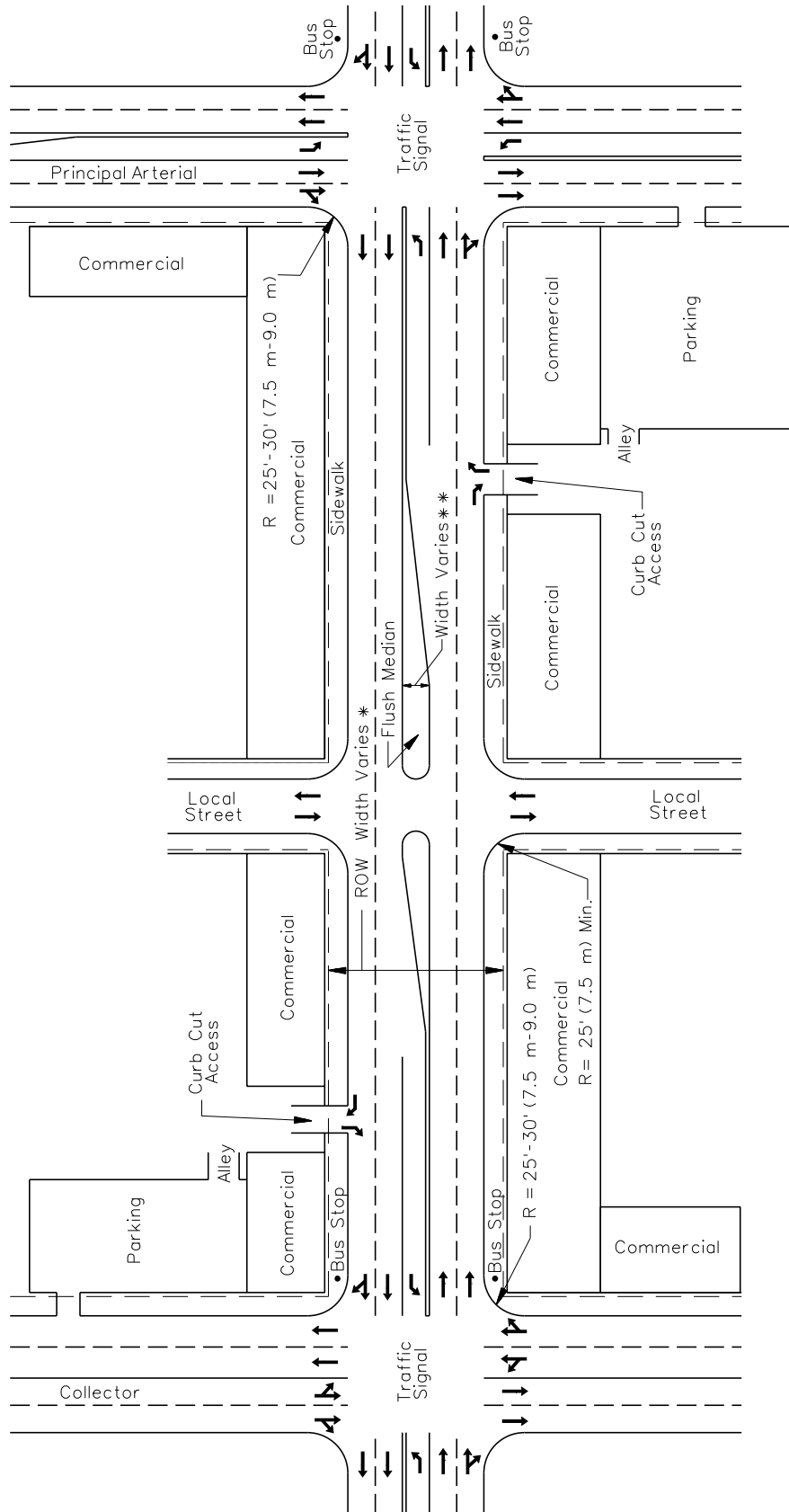
### 46-2.02 Geometric Design Elements

#### 46-2.02(a) Median Type

The presence of a median on urban SRA routes will provide protection for left-turning vehicles at cross streets, direct turning movements to desired locations, and reduce opposing traffic conflicts. The typical design is a flush median with an 11 ft (3.3 m) width. A flush median delineated with thermoplastic or painted markings offers a measure of median control in urban areas where limited right-of-way is available and where numerous access points exist.

#### 46-2.02(b) Additional Lanes

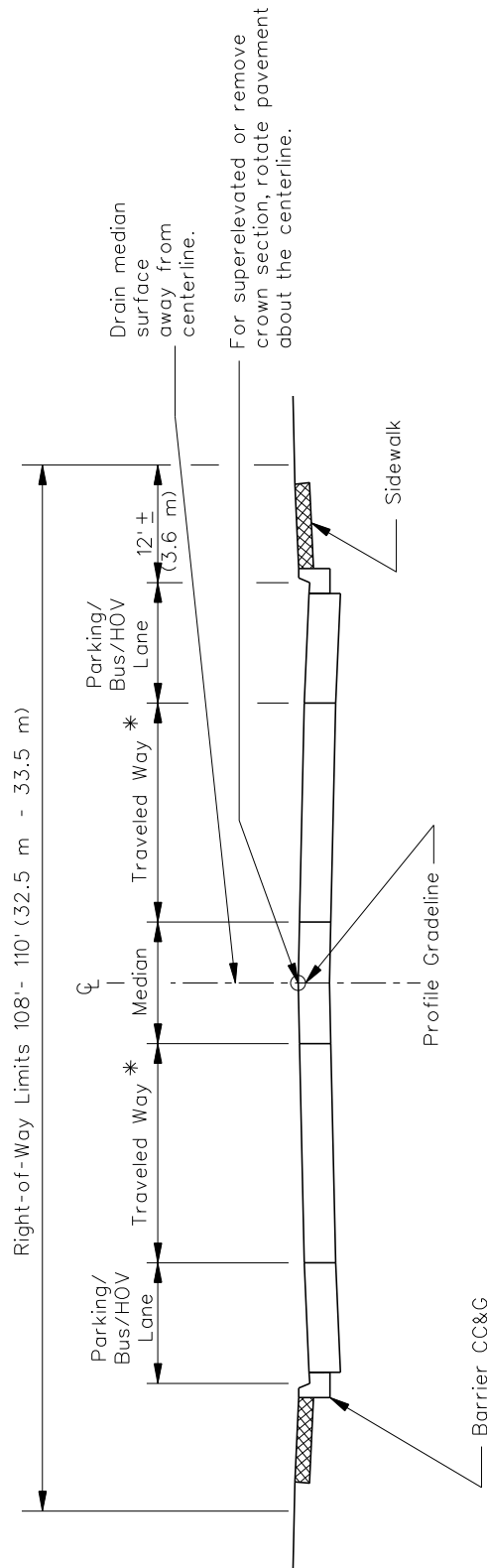
On urban SRA routes, there is often little right-of-way available for roadway widening. Additional lanes generally can only be added by using the existing pavement (e.g., converting a parking lane to a travel lane). Section 46-2.08 discusses the removal of on-street parking.



- \* If no bus/HOV only lanes are required, ROW is typically 82 ft to 87 ft (25 m to 26.5 m) assuming a flush left-turn lane.
- \*\* If an 11 ft (3.3 m) wide flush median cannot be obtained due to restricted ROW, then consider and investigate a one-way arterial pair.

**TYPICAL URBAN SRA ROUTE  
(Two-Block Segment)**

**Figure 46-2.A**



\* Where it is desirable to accommodate bicycle demand and ROW is not restricted, an additional width may be added to each direction of the traveled way for bicycles.

**DESIRABLE URBAN SRA CROSS SECTION**  
(With HOV/Bus Lanes)

**Figure 46-2.B**

#### **46-2.02(c) Horizontal and Vertical Clearances**

The vertical clearances for urban SRA routes are presented in Figures 33-5.A and 46-2.E. Because most urban SRA's are existing routes, vertical clearances may need to be increased to provide for the unrestricted movement of large vehicles. Bridges that do not provide a minimum of 14 ft 09 in (4.50 m) clearance above the roadway are candidates for modification. Bridges which provide a vertical clearance of 14 ft 00 in (4.25 m) may remain in place, but should be considered for reconstruction or other means to achieve a minimum vertical clearance of 14 ft 09 in (4.50 m). Where the SRA route is an underpass, the recommended method to increase the vertical clearance is to lower the roadway through milling, raising the pier height, reconstructing the bridge, or other methods. Carefully evaluate potential drainage and utility problems where these methods are proposed.

Horizontal clearances along urban SRA routes should provide 1.5 ft (500 mm) from face of curb to an obstruction. Bridge railings and abutments are typically the two most important items to check concerning horizontal clearances. See Section 38-3 for additional guidance. Obstructions (e.g., utility poles) within this clearance should be modified or reconstructed, if feasible.

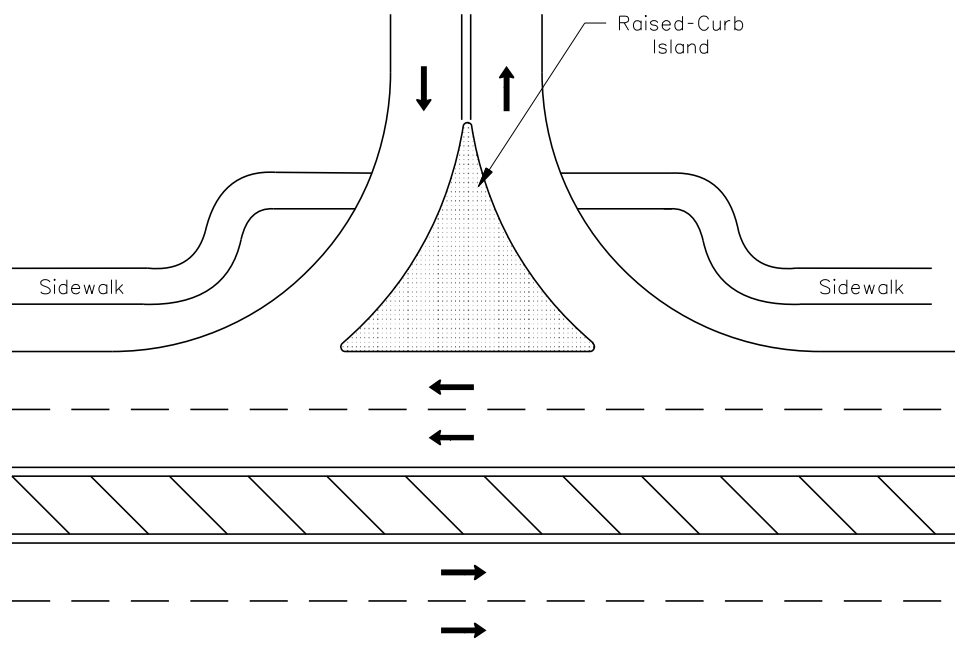
#### **46-2.03 Access Management**

The use of access management techniques is one of the most important concepts implemented on the SRA system. Length of travel time and driver safety are influenced by the number and configuration of access points to the SRA. Each driveway and cross street reduces mobility and safety. Where this may be a problem, consider the following techniques:

1. Eliminate Local Street Access. To improve operations, evaluate closing some local low-volume streets. This is generally not considered a problem where the typical urban street pattern is (8 to 12 streets per mile (5 to 8 streets per km)). Do not close streets that serve as collectors. Where streets are closed, maintain access for pedestrians and bicyclists, where practical.
2. Restricting Curb Cuts. Where curb-cut access is allowed along urban SRA routes, it is preferable that only right-in and right-out turns be permitted. This will prevent left-turn movements from and onto the SRA across through traffic lanes. An example of this design is shown in Figure 46-2.C. This is especially important where a left-turn lane cannot be provided. Another desirable feature is to minimize the number of access points by eliminating or consolidating curb cuts. However, because it is impractical to eliminate all curb cuts, the most beneficial way to increase the efficiency of through movements is to provide for a center-turn lane on the urban SRA. This design feature will remove turning traffic from through lanes.

Chapter 35 provides further guidance on access management techniques that are also applicable to urban SRA routes.





*Note: Where ROW is restricted, favor ingress maneuvers over egress maneuvers.*

### DRIVEWAY CHANNELIZATION (Right-In and Right-Out Only)

Figure 46-2.C

#### 46-2.04 Intersections

In addition to Chapter 36, the following is applicable to intersections on urban SRA routes:

1. Turn Lanes. Section 36-3 provides the warrants and design criteria for turn lanes. Where turn lanes are provided, maintain at least two through lanes in each direction. In addition, the following will apply:
  - a. Left-Turn Lanes. Provide left-turn lanes at all signalized intersections. Where a left-turn lane cannot be provided on the SRA to local streets, discourage or prohibit the left turns.
  - b. Right-Turn Lanes. Where pavement width is available, include right-turn lanes where warranted. It is recommended that parking on the approach and far side of the intersection be prohibited within 100 ft (30 m) of all major intersections to allow for a right-turn lane.
  - c. Dual Left-Turn Lanes. Where there are high left-turn volumes and available right-of-way, dual left-turn lanes are recommended to alleviate congestion. If used, operate dual left-turn lanes using the “protected only” phasing. For access

management, separate the dual left-turn lanes and the turn lane taper from opposing through lanes by a raised-curb median; see Chapters 35 and 36.

2. Turning Radii. Insufficient turning radii for trucks can significantly affect capacity at an intersection. Small radii may require large trucks to slow down to maneuver through the turn, encroach in opposing lanes, or encroach onto the curb. Design the curb radii to meet the expected design vehicle. Intersection design vehicles are discussed in Section 36-1.08. However, do not indiscriminately apply turning radii improvements to urban intersections. Frequently, in urban areas there are heavy pedestrian volumes and shallow setbacks for buildings. Only propose turning radii improvements after a determination that the existing sidewalk width and adequate pedestrian capacity can be maintained.
3. Approaches. Intersections on urban routes with more than four approaches can cause operational problems. To alleviate this problem, consider one of the following options:
  - close one of the approaches;
  - install a roundabout;
  - convert one of the approaches to one-way operation going away from the intersection;
  - provide an extremely short signal timing on one of the approaches to reduce the desirability of the approach; or
  - relocate the excess approaches away from the intersection. This is the most desirable option. However, right-of-way requirements usually make this option difficult to implement.
4. Medians. Where a median cannot be provided on the SRA route, movements between the local streets and the SRA may be restricted to the right-in/right-out.
5. Capacity. At intersections where capacity is limited and volumes are high, left-turn restrictions and the elimination of signalized turn phases may be necessary. This will increase the capacity on the SRA route and reduce intersection conflicts. Alternative routes or access will be required for the affected movements. In some instances, limiting left-turn movements during peak periods on the SRA route may be beneficial to through roadway operations. This alternative is appropriate at locations where turn lanes are not available.
6. Pavement Markings. Chapter 36 and the *Illinois MUTCD* provide information on pavement markings at channelized intersections.
7. Pedestrians. Where pedestrians are required to cross wide intersections, raised-curb center islands of sufficient size and width can provide a refuge area for pedestrians.

#### **46-2.05 Railroad Grade Separations**

Grade separations at railroads provide the greatest capacity and safety on an SRA route. However, limited right-of-way and economic considerations in urban areas may restrict the use of grade separations to isolated locations. Protection of sufficient right-of-way is critical where a grade separation is recommended. Design criteria for grade separations are discussed in Chapter 44.

#### **46-2.06 Interchanges**

In urban areas, right-of-way and economic feasibility tend to restrict the use of interchanges. However, where the intersection peak-hour level of service in the design year is expected to be E or F, consider providing an interchange. Where interchanges are provided, the single point urban diamond interchange or compressed diamond interchange are recommended to fit into existing right-of-way limitations. Chapter 37 provides further guidance on the selection of interchange types.

Under certain conditions, consider providing a U-turn movement at the cross street as discussed in Section 37-3.04. This design allows the exiting driver access to the opposing frontage road without passing through the signalized intersection on the cross street.

Where an interchange is proposed at the intersection of two SRA routes, give priority for the grade-separated structure to the route with the higher traffic volume.

Evaluate upgrading existing incomplete interchanges to provide for all movements (e.g., half diamonds, partial cloverleaves). Traffic conditions and directional flows that existed at the time of initial construction may have significantly changed. In addition to providing all movements, evaluate widening existing structures, lengthening storage bays for left-turning vehicles, adding right-turn lanes, and interconnecting traffic signals to improve traffic progression along the SRA route.

#### **46-2.07 Drainage**

Drainage problems are intensified in urban areas where high runoff coefficients are often combined with storm drainage systems of inadequate capacity. The *IDOT Drainage Manual* provides guidance for the design and construction of all drainage improvements. Chapter 48 illustrates a more efficient means to reduce the flow of water from the high side to the low side of a superelevated urban horizontal curve.

#### **46-2.08 Removal of On-Street Parking**

Although on-street parking is typically permitted on portions of urban SRA routes, it can significantly affect the capacity of the route and may constitute a safety hazard as drivers enter and exit parking spaces. Where practical, consider permanently removing the on-street parking or restricting it during peak hours. However, before pursuing these actions, there should be

sufficient off-street parking available, and the route should meet one or more of the following conditions:

- there are less than two travel lanes in each direction and there is insufficient room to provide two through lanes within the existing cross section,
- the projected level of service is expected to be D or worse during peak hours,
- there are high number of crashes attributed to the on-street parking (e.g., 5 crashes per year per 10,000 ADT), and/or
- there is a need for a median where none currently exist.

If adequate off-street parking exists in public or private lots and garages, eliminate the on-street parking. If the existing parking inventory is not adequate to absorb those vehicles currently parked on the street, consider adjacent parcels (vacant or non-vacant) of land in the vicinity that could be developed for additional off-street parking.

#### **46-2.09 Traffic Control Devices**

##### **46-2.09(a) Traffic Signals**

Interconnect all traffic signals on urban SRA routes into signal networks or signal systems. Signal networks are beneficial in urban areas where grid patterns of signalized intersections, parallel one-way SRA routes, or intersecting SRA routes exist. The network should establish a priority of the through movement for the SRA route. Where an urban SRA route is not located in a grid pattern of signalized intersections, or where numerous other signals are too close to establish a network, then signals along the SRA should be interconnected into a system to provide for progression of traffic.

Time all signal networks and signal systems on urban SRA routes for optimal progression based on a traffic engineering study. When timing traffic signals on urban SRA routes, a peak-hour level-of-service D is the lowest level-of-service acceptable for the SRA through lanes. This may require turning movements and cross streets to operate at a lower level-of-service, or this could require the use of one-way arterial pairs.

The use of a lagging left-turn signal phase (i.e., the left-turn phase comes after the through phase) can improve signal synchronization. Progression bandwidths, which control the time available during which all vehicles can progress through a series of signals, can be increased with lagging left-turn phasing. However, use this type of phasing at T-intersections or intersections that only allow left turns during a protected phase. Do not use lagging left turns where left turns are permitted during the permissive green phase.

In many urban areas pretimed traffic signals are commonly used. If pretimed traffic signals that are not tied into the network are encountered along urban SRA routes, consider replacing them with fully actuated signals.

Chapter 57 and the Bureau of Operations *Policies and Procedures Manual* provide additional information on traffic signals.

#### **46-2.09(b) Stop Sign Removal**

Stop sign control for traffic movements on an SRA route is inconsistent with giving priority to the SRA through movement. Therefore, remove any stop signs on the urban SRA route. However, before removal, it will be necessary to conduct a traffic engineering study to determine the appropriate traffic control at the location for both the SRA route and the intersecting cross street.

#### **46-2.09(c) Pavement Markings**

Because of their durability and visibility, only use high-type pavement markings on SRA routes. High-type pavement markings include thermoplastic, epoxy, and pre-formed plastics. Also consider including raised pavement markers on SRA routes. Although street lighting is prevalent in the urban environment, raised pavement markers introduce an element of safety to the SRA route during inclement weather. Space raised pavement markers according to the criteria in the Bureau of Operations *Policies and Procedures Manual* and the *IDOT Highway Standards*.

#### **46-2.09(d) Driver Information Systems**

In addition to providing signs and pavement markings to guide motorists, furnishing motorists with information on congestion, construction, or other incidents that may affect their trip is important. Driver information systems may include variable or fixed message signing, radio and television traffic reports, newspaper articles, and brochures.

### **46-2.10 Trucks**

Preferably, locate all loading and unloading areas off the SRA route. This may be accomplished by improving alley access, moving loading areas to nearby side streets, providing a central mid-block loading area, etc. Where off-street loading options are not available, one option is to remove or restrict on-street parking. Locate these unloading zones away from intersections so that right-turning traffic can use the curb lane at the intersection.

### **46-2.11 Transit**

#### **46-2.11(a) Improvements**

There are numerous transit techniques that may be implemented to improve the operations of an urban SRA route. Some of these include:

1. Ridesharing. Carpools and vanpools are the most common form of ridesharing.

2. High Occupancy Vehicle (HOV) Lanes. This application is discussed in Section 46-2.11(c).
3. Transit Contra-Flow Lanes. This option allows transit vehicles to travel in the reverse direction from the general traffic in a reserved transit lane. This may be applicable if there is reserve capacity available in the non-peak direction. A physical barrier may be required to separate the bus lane from the opposing lanes.
4. Passenger Facilities. Consider providing passenger facilities that make it easier and safer to use transit facilities.
5. Signal and Intersection Improvements. Consider providing signal and intersection improvements that improve the transit operations (e.g., signal preemption, larger turning radii).

#### **46-2.11(b) Local Bus Service**

On urban SRA routes that accommodate bus routes, consider transit service enhancements to determine their potential for relieving traffic congestion. This may include the following:

1. Removing Parking. One option is to remove parking from the curb lane, with strict enforcement of parking restrictions, allowing the curb lane to be used as a HOV/bus lane (i.e., through or turning); see Section 46-2.08.
2. Bus Stops. Bus stop turnouts are generally not considered practical on urban SRA routes. However, review the location and spacing of bus stops, passenger amenities, and signal preemption to determine if improvements can be made. Major objectives would be to eliminate stops if there are more than one per block and to eliminate conflicts with right turns. Where the blocks are short, as in central business districts, stops could be located at every other block.
3. Exclusive Lanes. One strategy to improve travel times is to establish exclusive lanes for buses and high-occupancy vehicles during the morning and evening peak travel periods. The SRA route must have at least three traffic lanes in each direction. Section 46-2.11(c) provides further information on the suitability of HOV lanes in urban areas. A companion measure is to minimize access points next to an exclusive lane by eliminating curb cuts wherever practical.

#### **46-2.11(c) HOV Lanes**

High occupancy vehicle (HOV) lanes designated for buses, car pools, vanpools, and bicyclists may be appropriate in selected areas with high levels of transit ridership and ridesharing activity. There also should be adequate capacity to accommodate traffic in general use lanes. The following criteria and conditions are applicable outside the central business district for an HOV lane along the curb or median. The HOV lane should not involve major new construction or right-of-way acquisition (i.e., the existing pavement should be used). The facility should be

designed primarily for buses, although car pools, van pools, and bicyclists should also be encouraged. One or more of the following conditions should apply and all of the following criteria should be met before an HOV lane is implemented:

1. Conditions. One or more of the following conditions should be met:
  - a. High Level of Usage (Curb Lane). Route segments should have an existing or projected transit ridership of at least 1200 one-way passengers in the peak hour. A curb HOV lane should be used almost exclusively by buses. Existing or projected bus volumes should be 15 to 40 vehicles one-way in the peak hour. Figure 46-2.B illustrates a cross sectional view with a HOV/bus lane adjacent to a curb.
  - b. High Level of Usage (Median Lane). Route segments should have an existing or projected usage of 2400 one-way passengers or rideshare occupants in the peak hour. A higher demand threshold has been established for a median HOV lane to reflect the potential for higher costs and operational problems associated with implementation. Figure 46-2.D illustrates bus lane treatments within the median. Where used, general vehicular traffic should only be allowed to make left turns at other SRA routes.
2. Criteria. All of the following criteria must be met:
  - a. Reduce Total Person Delay. There should be a net reduction in the average travel time per person for all users of the route.
  - b. Minimal Disruption to Traffic Operations. It must be feasible to institute left-turn restrictions and signalization adjustments necessary for HOV operations with only minimal disruption to traffic flow in the general use lanes.
  - c. No Peak-Hour On-Street Parking or Loading. For implementation of a curb HOV lane, it must be feasible to prohibit parking and loading and unloading in the curb lane; see Section 46-2.08.
  - d. More than the Minimum Number of Travel Lanes. In urban areas, three through lanes should exist in each direction where one lane can be assigned for HOV use. This provides for the minimum of two through lanes to be maintained unless the situation warrants changing the street into a one-way arterial pair.

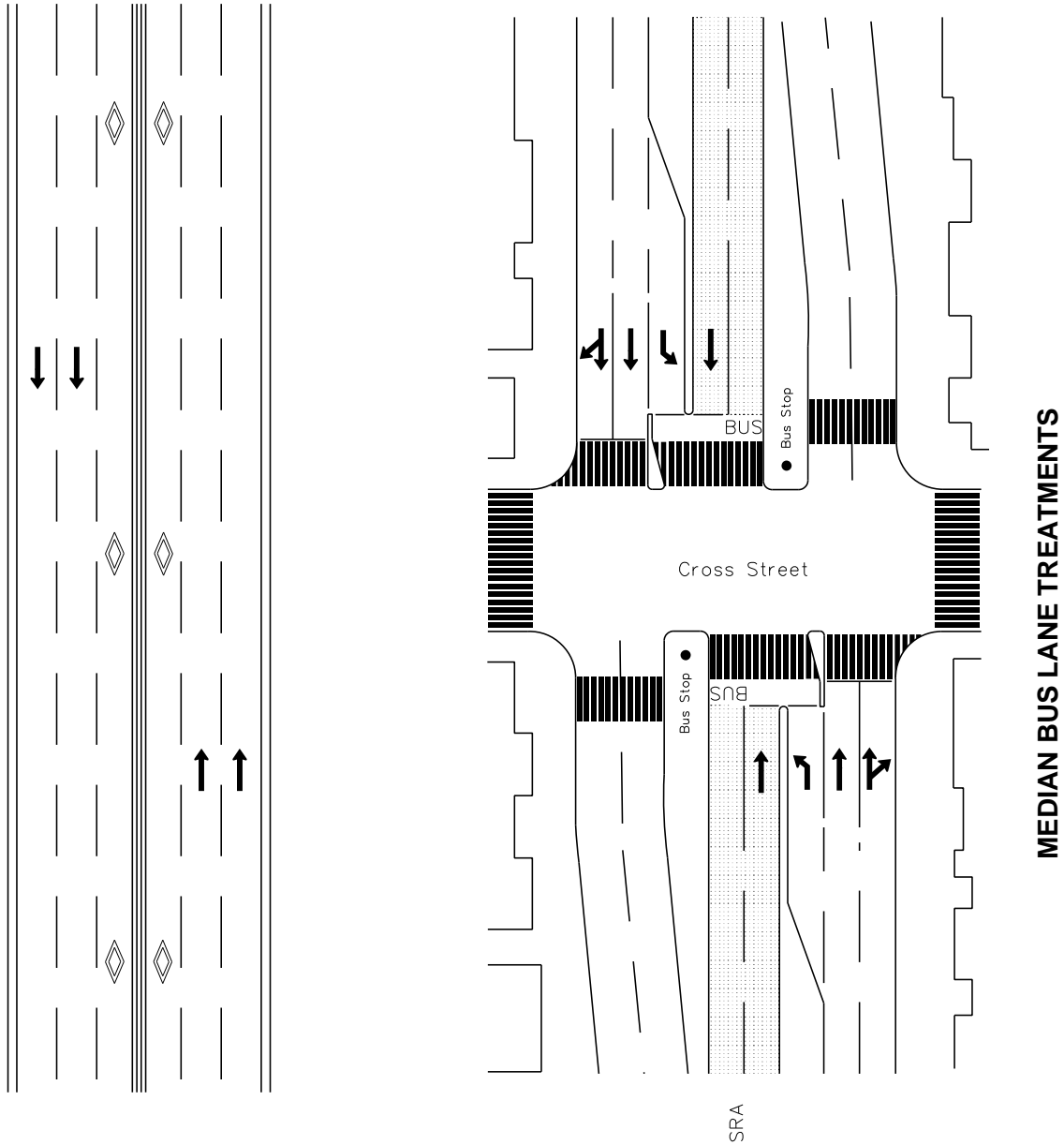


Figure 46-2.D



#### **46-2.12 Pedestrians and Bicyclists**

Safe movement and accessibility are key issues for bicyclists and pedestrians. Urban SRA corridors are likely to experience bicyclists and a high volume of pedestrians, which may significantly impact the capacity and operations of the SRA route. One advantage of urban routes is that there typically are close parallel routes that may be considered for bicycle and pedestrian routes. Identify these parallel facilities as bicycle routes so that the SRA routes can be reserved for vehicular traffic. At major obstacles (e.g., river crossings, canals, railroad bridges, limited access facilities), ensure that adequate provisions are available so that pedestrians and bicyclists have access across these barriers. Chapter 17 provides additional information for bicycle and pedestrian facilities. Chapter 58 provides information on disabled accessibility requirements.

#### **46-2.13 Environmental Considerations**

The environmental analysis component of the SRA planning process is primarily an inventory of existing conditions. The inventory identifies those environmental resources in the corridor and probable impacts based on roadway improvements. Environmental assessments will be performed during the Phase I design work. These are discussed in Part III “Environmental Procedures” of this *Manual*.

#### **46-2.14 Right-of-Way**

Where there is restricted right-of-way, it is generally not feasible to provide the desirable urban SRA cross section as shown in Figure 46-2.B. In restrictive right-of-way locations, the designer should consider implementing one or more of the following options:

- providing a minimum of two through lanes in each direction,
- only allowing left turns from the SRA route at major intersections,
- consolidating and restricting intermediate access points,
- restricting on-street parking,
- restricting on-street loading and unloading zones,
- developing a one-way arterial pair, and/or
- considering alternative right-of-way acquisitions.

Where feasible, purchase additional right-of-way which allow improvements to the overall cross section of the SRA or to major intersections.

#### **46-2.15 Tables of Design Criteria**

Figure 46-2.E presents the Department's design criteria for new construction and reconstruction of urban strategic regional arterial projects. Figure 46-2.F provides the alignment criteria for urban SRA routes. The designer should realize that some of the cross section elements included in the figure (e.g., HOV/bus lanes) are not automatically warranted in the project

design. The values in the figure only apply after the decision has been made to include the element in the highway cross section.

Design Element		Manual Section	Desirable Design Values
Design Controls	Design Forecast Year	31-4.02	20 Years
	*Design Speed	31-2	30 mph – 40 mph (1)
	Access Control	46-2.03	Managed Access
	Level of Service	31-4.04	Northeast Illinois: D      Elsewhere: C
Cross Section	On-Street Parking	46-2.08	Not Recommended
	Traffic Signals	46-2.09	Spaced at ¼ mile Increments
	*Traveled Way Width	34-2.01	2 @ 24' (2)
	Auxiliary Lanes	34-2.03	Single Left & Right: 12', Min.: 11'      Dual Lefts: 24', Min.: 22'
			B-6.12 or B-6.24 CC&G
	Median Width	34-3.03	11', 12', 14' (3)
	Parking Lane Width	48-2.05	Des.: 10', Min.: 8' (4)
	Bicycle Lane Width (Shared)	46-2.12	Min.: 13'      Outside Lane
	Outside Curb Type and Width	34-2.04	B-6.24 CC&G
	Cross Slope	34-2.01	1/4"/ft for Median and Two Lanes Adjacent to Median (5)
Roadway Slopes	Sidewalk Width	48-2.04	10' Adjacent to Curb
	Clear Zone	38-3	(6)
	Side Slopes	34-4.04	—
		34-4.05	—
Bridges	Median Slopes	34-4.02	—
		34-3	1/4"/ft
	New and Reconstructed Bridges	N/A	HS-20
	Existing Bridges to Remain in Place	39-6	52' plus Median Width
		N/A	HS-20
	*Vertical Clearance (SRA Under) (9a)	39-6	48' without Medians or Sidewalk
		39-4	14'-9"
			14'-0" (9c)
	*Vertical Clearance (SRA over Railroad)	33-5	17'-3" (9b)
		39-4.06	New: 23'-0"      Existing: 21'-6"

\* Controlling design criteria (see Section 31-8).

### GEOMETRIC DESIGN CRITERIA FOR URBAN STRATEGIC REGIONAL ARTERIALS (SRA) (New Construction/Reconstruction) (US Customary)

Figure 46-2.E

Design Element		Manual Section	Desirable Design Values
Design Controls	Design Forecast Year	31-4.02	20 Years
	* Design Speed	31-2	50 km/h - 60 km/h (1)
	Access Control	46-2.03	Managed Access
	Level of Service	31-4.04	Northeast Illinois: D      Elsewhere: C
	On-Street Parking	46-2.08	Not Recommended
Cross Section	Traffic Signals	46-2.09	Spaced at 400 m Increments
	* Traveled Way Width	34-2.01	2 @ 7.2 m (2)
	Auxiliary Lanes	Lane Width	Single Left & Right: 3.6 m, Min.: 3.3 m      Dual Lefts: 7.2 m, Min.: 6.6 m
	Median Width	Curb Type and Width	B-15.30 or B-15.60 CC&G
	Parking Lane Width	Flush/TWLT	3.3 m, 3.6 m, 4.0 m (3)
	Bicycle Lane Width (Shared)	48-2.05	Des.: 3.0 m, Min.: 2.4 m (4)
	Outside Curb Type and Width	46-2.12	Min.: 4.0 m      Outside Lane
	Cross Slope	34-2.04	B-15.60 CC&G
	Sidewalk Width	34-2.01	2.0% for Median and Two Lanes Adjacent to Median (5)
Roadway Slopes	Clear Zone	48-2.04	3.0 m Adjacent to Curb
	Side Slopes	38-3	(6)
		34-4.04	—
		34-4.05	—
	Median Slopes	34-4.02	—
Bridges	New and Reconstructed Bridges	34-3	2%
		N/A	MS-18
	Existing Bridges to Remain in Place	*Structural Capacity	15.6 m plus Median Width
		*Clear Roadway Width (7)	MS-18
	*Vertical Clearance (SRA Under) (9a)	*Structural Capacity	14.4 m without Medians or Sidewalk
		*Clear Roadway Width (8)	4.5 m
		New and Replaced Overpassing Bridges (9b)	4.3 m (9c)
	*Vertical Clearance (SRA over Railroad)	Existing Overpassing Bridges	5.25 m (9b)
		Overhead Signs/ Pedestrian Bridges	New: 7.0 m      Existing: 6.6 m

\* Controlling design criteria (see Section 31-8).

**GEOMETRIC DESIGN CRITERIA FOR URBAN STRATEGIC REGIONAL ARTERIALS (SRA)**  
**(New Construction/Reconstruction)**  
**(Metric)**

Figure 46-2.E

- (1) Design Speed. The 30-mph (50-km/h) design speed should only be used in central business districts.
- (2) Traveled Way Width. If right-of-way is restricted, 11 ft (3.3 m) travel lanes may be used (i.e., 2 @ 22 ft (6.6 m)).
- (3) Flush Median Width. Use 14 ft (4.0 m) if there is a significant number of trucks making left turns. If a 11 ft (3.3 m) wide flush median cannot be provided due to restricted right-of-way, consider the use of a one-way arterial pair.
- (4) Parking Lane Width. If the parking lane will be used as a travel lane or bus/HOV lane during peak hours or may be converted to a travel lane in the future, provide a 12 ft (3.6 m) width. The width of the parking lane includes the gutter width.
- (5) Travel Lane Cross Slope. For parking/bus/HOV lanes, the cross slope is 5/16"/ft (2.5%).
- (6) Clear Zone. For curbed facilities, the minimum horizontal clearance to an obstruction is 1.5 ft (500 mm) measured from the face of curb.
- (7) New and Reconstructed Bridge Widths. Clear roadway bridge widths are measured from face to face of outside curbs or parapets walls. Urban bridge widths are normally defined as the sum of the approach traveled way widths, the width of the median, and the width of gutters. A sidewalk or bikeway will result in additional bridge width. For sidewalks proposed on bridge, add 10 ft (3.0 m) to each side of bridge.
- (8) Existing Bridge Widths to Remain in Place. Clear roadway bridge widths are measured from face to face of outside curbs or parapet walls. Implies elements allowed to remain in place without a design exception approval when cost effective and when safety record is satisfactory. Provide at least one sidewalk across the bridge.
- (9) Vertical Clearance (SRA Under).
  - a. The clearance must be available over the traveled way and median where a flush median is used.
  - b. Table value includes allowance for future overlays.
  - c. The 14 ft 0 in (4.3 m) clearance may be allowed to remain in place with consideration for reconstructing to a clearance of 14 ft 9 in (4.5 m).

**GEOMETRIC DESIGN CRITERIA FOR URBAN STRATEGIC REGIONAL ARTERIALS (SRA)**  
**(New Construction/Reconstruction)**  
**(Footnotes)**

**Figure 46-2.E**

Design Element	Manual Section	Design Speed	
		30 mph	40 mph
* Stopping Sight Distance (1)	31-3.01	200'	305'
Decision Sight Distance (2)	31-3.02	620'	825'
Intersection Sight Distance (3)	36-6	335'	445'
* Minimum Radii (4)	$e_{max} = 4\%$	250'	535'
* Superelevation Rate (5)	48-5	$e_{max} = 4\%$	
* Horizontal Sight Distance	32-4	(6)	
* Vertical Curvature (K-values)	Crest	19	44
	Sag	37	64
* Maximum Grade	Level	7%	7%
Minimum Grade	33-2.02	Des: 0.5% Min: 0.3% (with Curb and Gutter)	Des: 0.5% Min: 0.3% (with Curb and Gutter)
	33-2.03		

\* Controlling design criteria (see Section 31-8).

- (1) Stopping Sight Distance. Table values are for passenger cars on level grade.
- (2) Decision Sight Distance. Table values are for the avoidance maneuver on urban streets (speed/path/direction change).
- (3) Intersection Sight Distance. Table values are for passenger cars. See Section 36-6 for trucks.
- (4) Minimum Radii. Values shown are for a 4% superelevation rate. For a normal crown section, the minimum radii are 335 ft and 765 ft for design speeds of 30 mph and 40 mph respectively.
- (5) Superelevation Rate. See Section 48-5 for superelevation rates based on  $e_{max}$ , design speed, and radii of horizontal curves.
- (6) Horizontal Sight Distance. For a given design speed, the necessary horizontal sight line offset will be determined by the radius of curve and the required sight distance.

## ALIGNMENT CRITERIA FOR URBAN STRATEGIC REGIONAL ARTERIALS (SRA) (US Customary)

Figure 46-2.F

Design Element	Manual Section	Design Speed	
		50 km/h	60 km/h
*Stopping Sight Distance (1)	31-3.01	64 m	83 m
Decision Sight Distance (2)	31-3.02	195 m	235 m
Intersection Sight Distance (3)	36-6	105 m	126 m
*Minimum Radii (4)	$e_{max} = 4\%$ 48-5	86 m	135 m
*Superelevation Rate (5)	48-5	$e_{max} = 4\%$	
*Horizontal Sight Distance	32-4	(6)	
*Vertical Curvature (K-values)	Crest	7	11
	Sag	12	17
*Maximum Grade	Level	7%	7%
Minimum Grade	33-2.02 33-2.03	Des: 0.5% Min: 0.3% (with Curb and Gutter)	Des: 0.5% Min: 0.3% (with Curb and Gutter)

\* Controlling design criteria (see Section 31-8).

- (1) Stopping Sight Distance. Table values are for passenger cars on level grade.
- (2) Decision Sight Distance. Table values are for the avoidance maneuver on urban streets (speed/path/direction change).
- (3) Intersection Sight Distance. Table values are for passenger cars. See Section 36-6 for trucks.
- (4) Minimum Radii. Values shown are for a 4% superelevation rate. For a normal crown section, the minimum radii are 116 m and 189 m for design speeds of 50 km/h and 60 km/h respectively.
- (5) Superelevation Rate. See Section 48-5 for superelevation rates based on  $e_{max}$ , design speed, and radii of horizontal curves.
- (6) Horizontal Sight Distance. For a given design speed, the necessary horizontal sight line offset will be determined by the radius of curve and the required sight distance.

## ALIGNMENT CRITERIA FOR URBAN STRATEGIC REGIONAL ARTERIALS (SRA) (Metric)

Figure 46-2.F





## **46-3 SUBURBAN SRA ROUTES**

### **46-3.01 General Roadway Features**

#### **46-3.01(a) General**

The recommended design for suburban SRA's is three lanes in each direction divided by a raised-curb median. Initially, provide a minimum of two travel lanes in each direction. Reserve sufficient right-of-way to allow for the recommended design. Figure 46-3.A illustrates a plan view design configuration for a suburban SRA. Figure 46-3.B illustrates the initial and recommended cross sections for a suburban SRA. For an illustration of a superelevated section, see Figure 45-2.G.

#### **46-3.01(b) Bypass Facilities**

Certain suburban SRA routes are characterized by relatively lengthy segments of roadway that connect suburban central core areas. Frequently, these suburban central cores feature traffic capacity constraints (e.g., narrow right-of-way, minimal setbacks, numerous curb cuts, traffic signals). The recommended suburban SRA route (i.e., typical section of six through lanes and an 18 ft, 22 ft, or 30 ft (5.5 m, 7.0 m, or 9.5 m) median width) generally will not be attainable through such suburban cores. Therefore, it may be advantageous to designate a bypass route for the SRA around these central core areas. Bypass routes should be designated on parallel facilities reasonably close to the original SRA route and must be clearly signed as such. Bypass routes may be designed to work in tandem with the originally designated SRA or may become the solely designated SRA. In either case, the travel demands of the area and stipulated level-of-service requirements should be met where a bypass route is proposed.

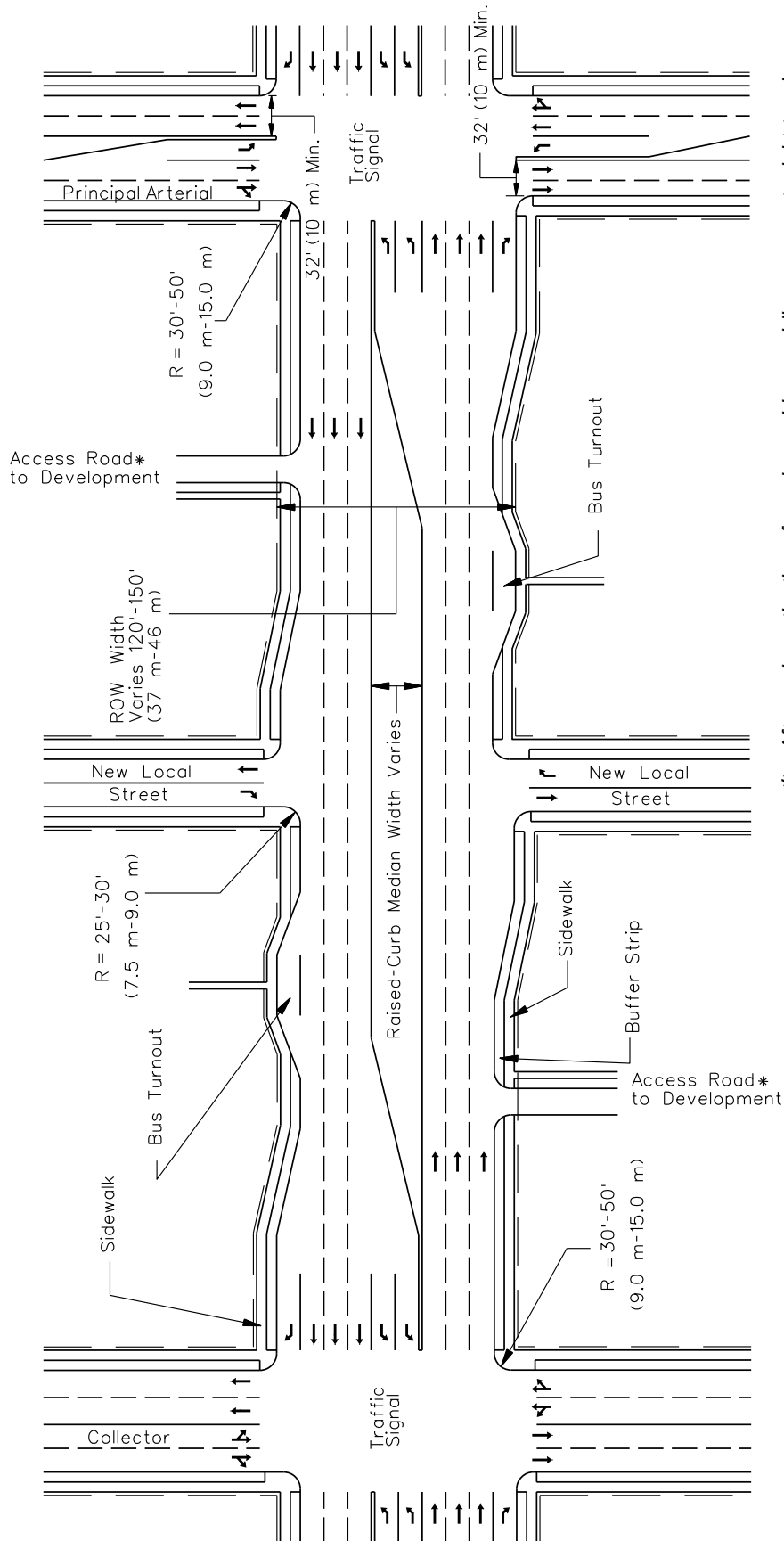
Due to the extent of suburban development, it is recommended that bypass routes usually be designated on existing roads. Only consider construction of a new roadway where large tracts of undeveloped land or unused rights-of-way exist. In this case, provide a facility with partial access control.

### **46-3.02 Geometric Design Elements**

#### **46-3.02(a) Median Types**

When selecting and designing medians for suburban SRA routes, consider the following:

1. General. If a proposed suburban SRA route presently consists of only a four-lane cross section (two through lanes in each direction) in a restrictive right-of-way location, it is recommended that emphasis be placed upon the construction of a 18 ft (5.5 m) median to separate left-turning vehicles from the through stream of traffic. If no additional right-of-way is available for a median, only permit left turns at major intersections or consider the feasibility of creating one-way arterial pairs.

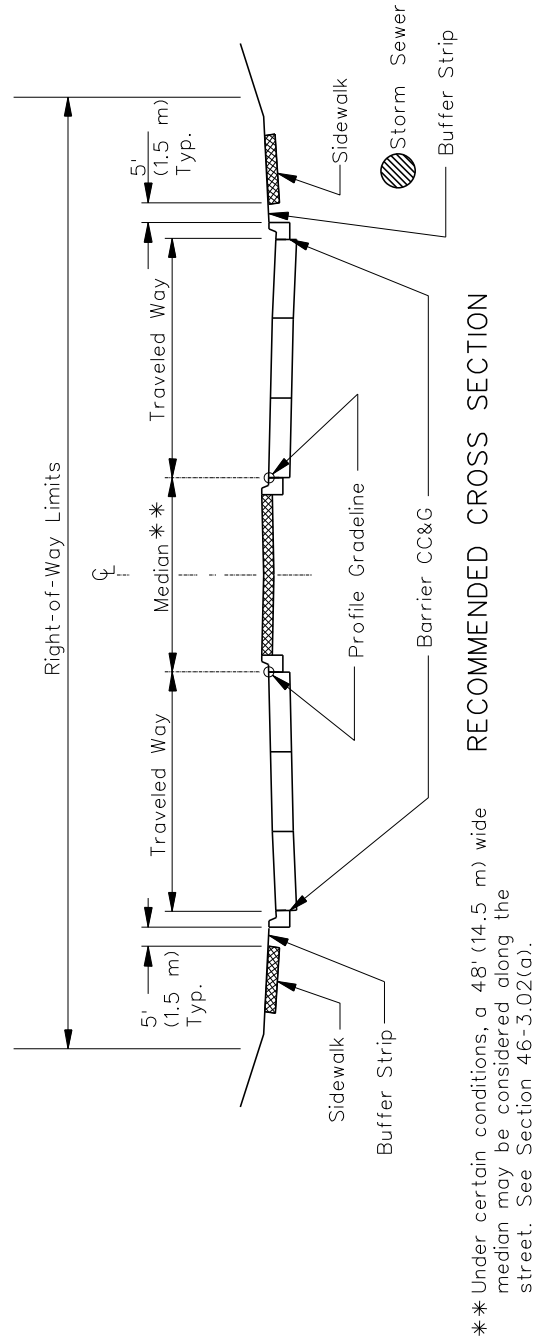
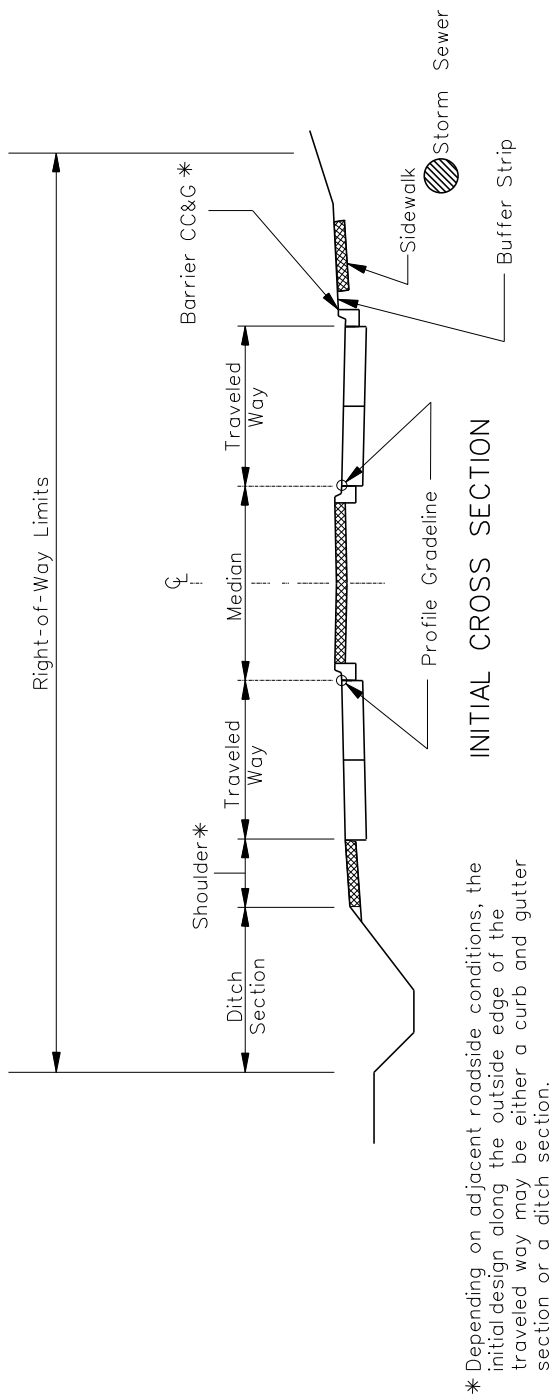


\* After an investigation of need, consider providing a separate right-turn lane on the SRA into the development.

Note: See Section 36-1.08 for selection of design vehicles.

### TYPICAL SUBURBAN SRA ROUTE (1/2 mile (800 m) Segment)

Figure 46-3.A



**SUBURBAN SRA CROSS SECTION**  
(initial and Recommended)

**Figure 46-3.B**

2. **Raised-Curb Median.** It is recommended that all suburban SRA routes be constructed with barrier-curb medians, but barrier-curb is required adjacent to dual left-turn lanes. The raised-curb median will prohibit left-turning vehicles at minor cross streets and driveways, direct turning movements to desired locations, and reduce opposing traffic conflicts. Because raised-curb medians control the location of left turns from the street, there may be the need to allow occasional U-turn movements at certain signalized intersections along the SRA route. These movements can provide access to both sides of the roadway while limiting crossing maneuvers at mid-block locations. Signal timing must be adjusted to provide the additional left-turn signal time needed for the U-turns.

The desirable median width on suburban SRA routes is 22 ft (7.0 m) where unsignalized intersections will exist. The 22 ft (7.0 m) width allows for the storage of most passenger vehicles in the median at unsignalized intersections for crossover movements or for left turns from the side street onto the SRA. If no unsignalized intersections will exist on a segment of the SRA or where right-of-way is restricted, the median width can be reduced to 18 ft (5.5 m) where single left-turn lanes are provided. However, if it is determined that dual left-turn lanes are needed, the minimum median width is 30 ft (9.5 m).

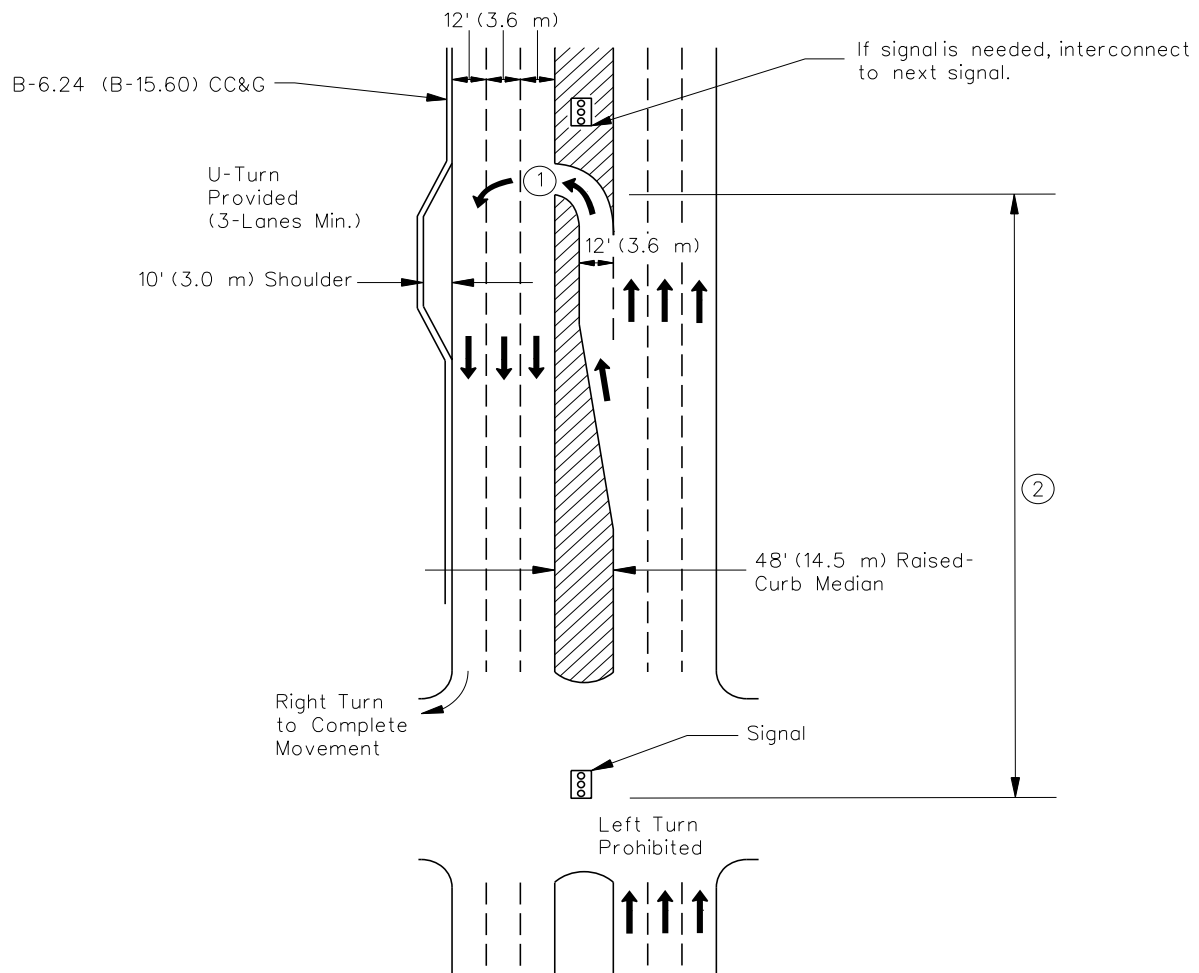
Under some circumstances, it may not be practical to use a raised-curb median. In these cases, consider providing a flush or traversable TWLTL design.

3. **U-Turn Crossovers with Raised-Curb Medians.** On some high-volume suburban SRA routes, the volume of left turns at many intersections may cause reduced traffic flow for through movements. Also, there may be a considerable demand for U-turn movements by large trucks serving businesses and industry along the route. If sufficient right-of-way is available, an alternative strategy is to not allow left turns at major intersections, but instead provide for a U-turn movement beyond the intersection. The benefits are increased capacity on the SRA route and simplified intersection phasing. An example of this concept is shown in Figure 46-3.C.

Only use this concept where it can be provided continuously for a distance of 3 miles to 5 miles (5 km to 8 km) and where the proposed median is at least 50 ft (14.5 m) wide. Provide a B-6.24 (B-15.60) curb and gutter along the median and mound the median with earth. The mounded earth median may be landscaped along the centerline.

Use a WB-55 (WB-17) design vehicle for the design of the U-turn movement. Provide a 10 ft (3.0 m) wide outside stabilized shoulder with curb and gutter along the right edge of shoulder adjacent to the U-turn lane; see Figure 46-3.C.

4. **TWLTL Medians.** In areas where there are numerous access points along an existing roadway (e.g., commercial areas), continuous two-way left-turn lanes may increase mobility and reduce conflicts. This design may be considered in suburban areas where there are numerous existing access points and where other solutions to control access (e.g., frontage roads, access closures, raised-curb medians) cannot be implemented. Chapters 34 and 48 provide guidance on flush and traversable TWLTL.



**Notes:**

1. Use the WB-55 (WB-17) design vehicle for the design of the U-turn movement.
2. The minimum distance is dependent on the design speed of the street, left-turning volumes, and space needed for advance guide signs.

**U-TURN CROSSOVERS WITH A RAISED-CURB MEDIAN**

**Figure 46-3.C**

#### **46-3.02(b) Additional Lanes**

Some proposed suburban SRA routes may presently consist of a four- or five-lane pavement section through residential or commercial areas with minimal setbacks. It may not be feasible to obtain the additional right-of-way required for expansion into the recommended roadway cross section at these locations.

#### **46-3.02(c) Vertical Clearances**

The vertical clearances for suburban SRA routes are presented in Figure 46-3.E. Where practical on existing routes, vertical clearances may need to be increased to provide for the unrestricted movement of large vehicles. Bridges that do not provide a minimum of 14 ft 9 in (4.5 m) vertical clearance above the roadway are candidates for modification. Bridges which provide a vertical clearance of 14 ft 00 in (4.25 m) may remain in place, but should be considered for reconstruction or other means to achieve a minimum vertical clearance of 14 ft 9 in (4.5 m). Where the SRA route is an underpass, the recommended method to increase the vertical clearance is to lower the roadway through milling, raising the pier height, reconstructing the bridge or other methods. Carefully evaluate potential drainage and utility problems where these methods are proposed.

#### **46-3.03 Access Management**

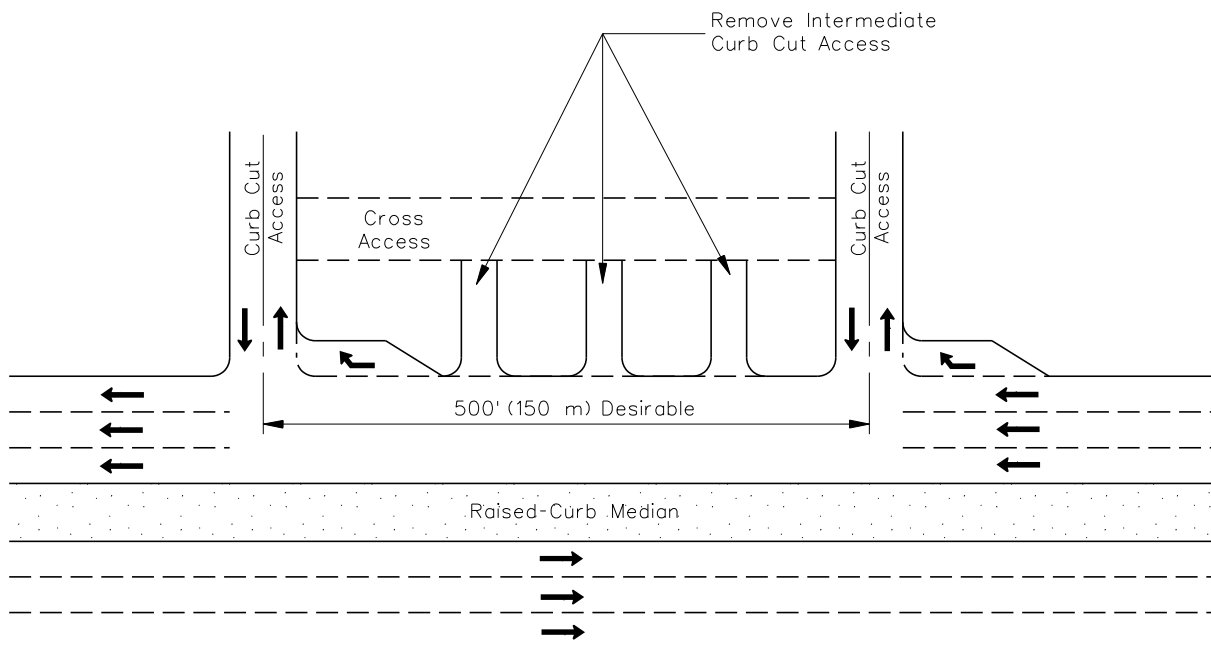
The use of access management techniques is one of the most important concepts implemented on the SRA system. The number and configuration of access points to a suburban SRA route influence length of travel time and driver safety. Each driveway and cross street reduces mobility and safety. To improve access management, consider the following techniques:

1. Eliminate Local Street Access. To improve operations, consider closing some low-volume minor roads and local streets. The feasibility of terminating or rerouting the minor route will depend on local street traffic volumes, emergency vehicle response times, and the availability of alternative routes.
2. Restrict Curb Cuts. To improve mobility and safety on the suburban SRA route, consider the following restrictions:
  - a. Sideroad Access. Where a parcel of property has access available from a side street, only allow access from the non-SRA route.
  - b. Directional Movements. Where curb-cut access is allowed along a suburban SRA route, it is preferable that only right-in and right-out turns be permitted. This will prevent left-turn movements onto the SRA across through traffic lanes. An example of this design is shown in Figure 46-2.C.
  - c. Consolidating Access Points. In suburban areas where numerous curb-cut access points are present, it is recommended that the access be consolidated into single points at a desirable spacing of 500 ft (150 m) between access points.

This is illustrated in Figure 46-3.D. The properties should be interconnected through the use of cross-access easements.

- d. Left-Turn Restrictions. Discourage left-turn movements from the SRA into curb-cut access points. However, where this prohibition may not be feasible, increase the length of the turn-lane storage to accommodate left-turn queues during peak hours.
3. Develop Internal Access. Where new development or redevelopment occurs adjacent to a suburban SRA, it is desirable to provide internal circulation roads within the development. Design the circulation roads to accommodate not only automobiles, but delivery trucks, transit, and bicycles. Also, provide sidewalks within the development. If a signal and median crossover are warranted at the new access point, the spacing should not be less than  $\frac{1}{4}$  mile (400 m) to an adjacent signal.

Access management principles should be coordinated among communities along each suburban SRA route. Chapter 35 provides further guidance on access management techniques that are also applicable to suburban SRA routes.



**CONSOLIDATED ACCESS  
(Suburban SRA)**

**Figure 46-3.D**

#### 46-3.04 Intersections

In addition to Chapter 36, the following is applicable to intersections on suburban SRA routes:

1. Turn Lanes. Section 36-3 provides the warrants and design criteria for turn lanes. Where developing turn lanes, it is important to maintain at least two through lanes in each direction. In addition, the following will apply:
  - a. Left-Turn Lanes. Provide left-turn lanes at all intersections. It is recommended that the turn lanes be offset to provide increased sight distance to opposing traffic. See Section 36-3.03 for the design of offset left-turn lanes.
  - b. Right-Turn Lanes. Provide right-turn lanes where warranted.
  - c. Dual Left-Turn Lanes. Where there are high left-turn volumes, consider providing dual left-turn lanes to alleviate congestion where the single left-turn lane storage length is inadequate (e.g., 350 ft (100 m)). Phasing for the dual left-turn lanes must operate under the “protected only” phasing. For access management, separate the dual left-turn lanes and the left turn taper from opposing through lanes by a raised-curb median; see Chapters 35 and 36. Within a suburban environment where development is eminent, provide a 30 ft (9.5 m) wide median to allow for future flexibility at major entrances with dual left-turn lanes.
2. Turning Radii. Insufficient turning radii for trucks can significantly affect capacity at an intersection. Small radii may require large trucks to slow down to maneuver through the turn, to encroach into opposing lanes, or encroach onto the curb. Design the curb radii to meet the expected design vehicle, typically a WB-50 (WB-15). Review turning radii improvements for their impacts on pedestrians and adjacent development. Design vehicles are discussed in Section 36-1.08.
3. Approaches. Intersections on suburban routes with more than four approaches can cause operational problems. To alleviate this problem, consider one of the following options:
  - close one of the approaches,
  - convert one of the approaches to one-way operation going away from the intersection,
  - provide an extremely short signal timing on one of the approaches to reduce the desirability of the approach, or
  - relocate the excess approaches away from the intersection; this is the most desirable option.
4. Channelization. In suburban locations, the recommended cross section consists of three through lanes in each direction, dual left-turn lanes, and exclusive right-turn lanes. To reduce the wide expanses of intersections, use center channelization and consider the



use of corner islands to direct the flow of vehicles through the intersection. Channelization also can be effective at intersections where approaches are not at or close to 90° angles. At these locations, channelization and corner islands can help guide motorists through the unusual turning movements that are often required. Chapter 36 provides guidance on the design of channelized intersections.

5. New Intersections. It is recommended that intersections with new local roads be restricted to right-in/right-out movements. A raised-curb median will restrict left-turn movements from the SRA to the local road, left-turn movements from the local road onto the SRA, and through movements on the local road across the SRA. However, alternative routes and emergency vehicular response times must be evaluated.
6. Intersection Lighting. All suburban SRA to SRA route intersections should have appropriate intersection lighting. See Chapter 56 for information on highway lighting.
7. Capacity. At intersections where capacity is limited and volumes are high, left-turn restrictions and the elimination of signalized turn phases may be necessary. This will increase the capacity on the SRA route and reduce intersection conflicts. Alternative routes or access will be required for the affected movements. In some instances, limiting left-turn movements to off-peak periods on the SRA route may be beneficial to through roadway operations.

#### **46-3.05 Railroad Grade Separations**

Providing a grade separation over an intersecting railroad can increase capacity and safety. However, the feasibility of this type improvement is dependent upon projected traffic volumes, roadway characteristics, posted speed, duration and volume of rail movements, and the amount of right-of-way available for overpass construction.

Evaluate all at-grade railroad intersections with suburban SRA routes for a potential grade separation. Preference for grade separation construction may be given to freight rail crossings where delays due to the length of freight trains are considerably longer than at crossings for passenger rail lines. However, the requirement for grade separations at commuter rail lines is important because peak rail and roadway traffic always coincide. Additional factors to assess include the proximity of the rail line to adjacent arterial intersections, access requirements, right-of-way availability, and projected traffic volumes on the suburban SRA.

At all locations where railroad grade separations are not feasible, investigate the use of constant warning time warning devices. Constant warning time (CWT) devices adjust the downtime of the gates based on the speed of the train. This helps reduce excessive delays to vehicular traffic caused by gates being down when trains are not present. This type of device can also recognize when a train is stopped. This can be beneficial where a train station is near an at-grade rail crossing. In some cases, it may be a more conservative design to have a simple DC circuit instead of the CWT circuitry. This proposal should be reviewed by someone who is knowledgeable in both crossing circuitry and train operations at the specific location.

#### **46-3.06 Interchanges**

Consider constructing an interchange if the projected level of service of an intersection in the design year is E or F using conventional improvements. Intersections that operate at level-of-service D or better generally are not candidates for interchange construction, unless unsafe geometric design features (e.g., excessive intersection skew) are present. Chapters 37 and 45 provide further guidance for interchange warrants and interchange design.

Suburban SRA routes are frequently characterized by a limited right-of-way availability. Interchange types that require the least amount of right-of-way (e.g., single point urban diamond, compressed diamond) are considered the most appropriate for suburban SRA routes. See Chapter 37 for further information.

For an intersection of two suburban SRA routes and where sufficient right-of-way is available, consider providing a cloverleaf interchange design. The advantage of this interchange type over the diamond interchange is that both intersecting facilities have uninterrupted through movements.

Under certain conditions, a U-turn movement could be added to a compressed diamond interchange between a suburban SRA route and a lower class/volume cross street. The underpass U-turn lane allows SRA vehicles to access an opposing frontage road without passing through signalized intersections on the cross streets. Figure 37-3.G illustrates this design.

All suburban SRA interchanges should have lighting. However, the lighting should not create “light pollution” problems from spillover into nearby residential areas.

#### **46-3.07 Drainage**

On suburban SRA routes, roadway drainage generally will consist of an enclosed system. During roadway reconstruction for lane additions or intersection widening, evaluate the existing drainage system for capacity or flooding problems. Any improvements to the existing drainage system must meet the criteria in the *IDOT Drainage Manual*.

#### **46-3.08 Removal of On-Street Parking**

On-street parking is currently permitted on some portions of SRA routes in suburban areas. On-street parking can significantly affect the capacity of the SRA route and may constitute a safety hazard as drivers enter and exit parking spaces. Where practical, consider permanently removing the on-street parking or restricting it during peak hours. Section 46-2.08 provides criteria for removal of on-street parking on urban SRA routes. This is also applicable to a suburban SRA route with one exception — if the level-of-service on the suburban SRA route is C or worse, consider removing the on-street parking.

### **46-3.09 Traffic Control Devices**

#### **46-3.09(a) Traffic Signals**

Section 46-2.09 provides information on traffic signals for urban areas. In addition, the following applies to traffic signals in suburban areas:

1. Signal Type. Provide fully actuated traffic signals at all signalized intersections.
2. Signal Interconnection. Where feasible, interconnect all signalized intersections with a spacing of ½ mile (800 m) or less into signal systems. The interconnection is used to provide signal coordination and vehicular progression along the SRA route. Synchronize all signal systems along suburban SRA's for vehicular progression based on a traffic engineering study.
3. Spacing. If a signal is warranted at a local road or street, the spacing should not be less than ¼ mile (400 m) to an adjacent signal, but ½ mile (800 m) spacing is preferred.
4. Bus Preemption. All signalized intersections on suburban SRA routes should be capable of priority preemption for express bus service. This preemption capability should only be used to keep buses on schedule. Coordinate the preemption by buses with vehicular progression along the SRA route.
5. Level of Service. The goal of the traffic signal timing along suburban SRA routes is to achieve a level-of-service C or better for the arterial through lanes. To achieve this, it may be necessary to lower the level-of-service for the turning movements and cross streets to maximize the through movements on the SRA.

#### **46-3.09(b) Warrants for Traffic Signals**

Install traffic signals on SRA routes where the signal warrants in the *Illinois MUTCD* are met.

#### **46-3.09(c) Overhead Signing**

All suburban SRA-to-SRA route intersections should have advance overhead signing with route numbers and/or street names and, where appropriate, regional destinations. The lettering should be large enough to read at a distance of 350 ft to 400 ft (100 m to 125 m).

#### **46-3.09(d) Stop Sign Removal**

Stop sign control for traffic movements on an SRA route is inconsistent with giving priority to the SRA through movement. Therefore, remove stop signs from the through lanes of a suburban SRA route. However, it will be necessary to conduct a traffic engineering study to determine the appropriate traffic control at the location for both the SRA route and the intersecting cross street.

**46-3.09(e) Pavement Markings**

Because of their durability and visibility, only use high-type pavement markings on suburban SRA routes. High-type pavement markings include thermoplastic, epoxy, and pre-formed plastics. Also, include raised pavement markers on suburban SRA routes. Space raised pavement markers according to the criteria in the Bureau of Operations *Policies and Procedures Manual* and the *Highway Standards*. In addition, place reflectors on top of the raised-curb median.

**46-3.09(f) Driver Information Systems**

In addition to providing signs and pavement markings to guide motorists, it may be necessary to furnish information on congestion, construction, or other incidents which may affect their trip. Driver information systems may include variable or fixed message signing, radio and television traffic reports, newspaper articles, and brochures.

**46-3.10 Trucks**

Locate all loading and unloading areas off the suburban SRA street.

**46-3.11 Transit****46-3.11(a) Improvements**

Techniques associated with mass transit that may be applicable in certain suburban situations are described in Section 46-2.11. For suburban areas, it will also be necessary to improve transit station accessibility using one or more of the following techniques:

1. Actuated Traffic Signals. Transit station usage is extremely intensive during peak periods. Incorporating traffic signals on the SRA or connecting streets with phasing and timings that are responsive to the varying levels of traffic during the day will make transit stations more accessible and reduce delays. If new traffic signals are proposed at transit stations, they should meet the established traffic volume warrants and criteria for spacing of signals.
2. Turn Lanes. To maximize through traffic movements for vehicles not wishing to access transit stations, provide channelized right- and left-turn lanes for vehicles turning into transit stations. If demand is sufficient, provide dual left- and/or right-turn lanes. Appropriate storage bay lengths for turning vehicles must also be implemented.
3. Park and Ride Lots. Investigate providing parking for commuters. If a potential parking lot site is judged too far from the transit station, then parking in this area could be free or at a greatly reduced rate to encourage use. Another option is to provide satellite lots with free shuttle buses to the stations. Preferential parking stalls nearest to transit stations could be designated for High Occupancy Vehicles. Also, provide secure bicycle

parking at transit stations. Include left- and right-turn lanes at the entrance to the facility to enhance safety.

4. Transit Access. If substantial parking for a transit station is located on the opposite side of a SRA route, consider providing appropriate access for pedestrians.

#### **46-3.11(b) Express Bus Service**

Bus service on suburban SRA routes should be limited to express buses that are equipped with priority signal preemption capability that can be deployed when they are running behind schedule. However, coordinate the bus preemption with existing vehicular progression along the SRA route.

Design stops as bus turnouts; see Chapter 58. Walkways to stops of intersecting services will facilitate transfers and promote safety. Nearside and far-side bus stop configurations should be planned to minimize distances between connecting lines.

#### **46-3.12 HOV Lanes**

High occupancy vehicle (HOV) lanes designated for buses, carpools, and vans may be appropriate in selected areas with high levels of transit ridership and ridesharing activity. Note that there should also be adequate capacity to accommodate traffic in the general use lanes.

#### **46-3.13 Pedestrians and Bicyclists**

On suburban SRA routes, more options are available for accommodating pedestrian and bicycle access than in urban areas. For example, although right-of-way availability is still a critical issue, dense development immediately adjacent to the roadway is not as common an occurrence as in urban areas. Provisions for bicyclists and pedestrians may be accommodated within the SRA right-of-way itself. In suburban situations, alternative parallel routes may not always be available.

Access across major obstacles (e.g., river crossings, railroads, limited access facilities) or barriers will be accommodated by the SRA if alternative access is not feasible. The choice of how to provide access within the SRA corridor is determined on a case-by-case basis. Under all situations, the goal is to provide a continuous system of bicycle and pedestrian routes. Chapter 17 provides guidance on the design of bicycle and pedestrian facilities. Chapter 58 provides information on disabled accessibility requirements.

#### **46-3.14 Environmental Considerations**

The environmental analysis component of the SRA planning process is primarily an inventory of existing conditions. The inventory identifies those environmental resources in the corridor and probable impacts based on roadway improvements. Environmental assessments will be

performed during Phase I design work. These are discussed in Part III “Environmental Procedures” of this *Manual*.

#### **46-3.15 Right-of-Way Acquisition and Corridor Protection**

A major goal of the SRA planning process is to identify and protect future right-of-ways that are needed to construct the recommended roadway design configuration. Suburban right-of-ways may adjoin both developed and undeveloped properties. During Phase I studies, local governments should be contacted and encouraged to work with roadway jurisdictional agencies. This will ensure that adequate right-of-way is provided for suburban SRA routes in the approval process for new developments. Local governments should review their building setback requirements to ensure that all new building construction is outside the recommended SRA right-of-way widths. This will protect the right-of-way for future roadway expansion.

See the Bureau of Land Acquisition's *Manual of Policies and Procedures* for information on corridor protection procedures.

#### **46-3.16 Tables of Design Criteria**

Figure 46-3.E presents the Department's design criteria for new construction and reconstruction of suburban strategic regional arterial projects. Figure 46-3.F provides the alignment criteria for suburban SRA routes. The designer should realize that some of the cross section elements included in the figure (e.g., TWLTL widths) are not automatically warranted in the project design. The values in the figure only apply after the decision has been made to include the element in the highway cross section.

Design Element		Manual Section	Desirable Design Values
Design Controls	Design Forecast Year	31-4.02	20 Years
	* Design Speed	31-2	45 mph
	Access Control	46-3.03	Managed Access
	Level of Service	31-4.04	C or D (1)
	On-Street Parking	46-3.08	Not Recommended
Cross Section	Traffic Signals	46-3.09	Spaced at ½ mile Increments
	* Traveled Way Width	34-2.01	Initial: 2 @ 24' Recommended: 2 @ 36'
	Auxiliary Lanes	34-2.03	Single Left & Right: 12' Dual Lefts: 24'
			B-6.12 or B-6.24 CC&G
	Median Width	34-3	18', 22', 30' (2a)
			Flush: 12' or 14' (2b) Traversable: 16'
			Min.: 10' (3)
	Parking Lane Width	48-2.05	Min.: 13' Outside Lane
	Bicycle Lane Width (Shared)	46-3.13	B-6.24 CC&G
	Outside Curb Type and Width	34-2.04	
Roadway Slopes	* Travel Lanes	34-2.01	1/4"/ft for Two Lanes Adjacent to Median (4)
	Shoulder	46-3.02	Initial Stage Construction: 1/2"/ft
	Sidewalk Width	48-2.04	5' with Buffer Strip Behind Curb
	Clear Zone	38-3	(5)
	Cut Section (Uncurbed) (6)	34-4.03	1V/4H
	Ditch Width		6'
Bridges	Back Slope	34-4.04	1V/3H
	Cut Section (Curbed)	34-4.05	—
	Rock Cut	34-4.02	—
	Fill Section (Curbed)		—
	Concrete Median Surface		3/16"/ft
	TWLT	34-3	1/4"/ft
Bridges	Mounded with Grass		5/8"/ft towards C&G
	* Structural Capacity	N/A	HS-20
	* Clear Roadway Width (7)	39-6	52' plus Median Width (two lanes each direction) 76' plus Median Width (three lanes each direction)
	* Structural Capacity	N/A	HS-20
	* Clear Roadway Width (8)	39-6	48' plus Median Width
	New and Replaced Overpassing Bridges (9b)	39-4	14'-9"
	Existing Overpassing Bridges (9a)		14'-0" (9c)
	* Vertical Clearance (SRA Under) (9a)	33-5	17'-3" (9b)
Bridges	Overhead Signs/ Pedestrian Bridges		
	* Vertical Clearance (SRA Over Railroad)	39-4.06	New: 23'-0" Existing: 21'-6"

\* Controlling design criteria (see Section 31-8).

**GEOMETRIC DESIGN CRITERIA FOR SUBURBAN STRATEGIC REGIONAL ARTERIALS (SRA)**  
**(New Construction/Reconstruction)**  
**(US Customary)**

Figure 46-3.E

Design Element		Manual Section	Desirable Design Values
Design Controls	Design Forecast Year	31-4.02	20 Years
	*Design Speed	31-2	70 km/h
	Access Control	46-3.03	Managed Access
	Level of Service	31-4.04	C or D (1)
	On-Street Parking	46-3.08	Not Recommended
Cross Section	Traffic Signals	46-3.09	Spaced at 800 m increments
	*Traveled Way Width	34-2.01	Initial: 2 @ 7.2 m Recommended: 2 @ 10.8 m
	Auxiliary Lanes	34-2.03	Single Left & Right: 3.6 m Dual Lefts: 7.2 m
			B-15.30 or B-15.60 CC&G
	Median Width	34-3	5.5 m, 7.0 m, 9.5 m (2a)
			Flush: 3.6 m or 4.0 m (2b) Traversable: 5.0 m
	Parking Lane Width	48-2.05	Min.: 3.0 m (3)
	Bicycle Lane Width (Shared)	46-3.13	Min.: 4.2 m Outside Lane
	Outside Curb Type and Width	34-2.04	B-15.60 CC&G
			2% for Two Lanes Adjacent to Median (4)
	Cross Slope	46-3.02	Initial Stage Construction: 4%
	Sidewalk Width	48-2.04	1.5 m with Buffer Strip Behind Curb
	Clear Zone	38-3	(5)
	Side Slopes	34-4.03	1V:4H
			1.8 m
			1V:3H
Roadway Slopes	Cut Section (Uncurbed) (6)	34-4.04	—
			—
			—
	Fill Section (Curbed)	34-4.02	1.5%
			2.0%
	Concrete Median Surface	34-3	5.0% towards C&G
	TWLT		MS-18
Bridges	New and Reconstructed Bridges	N/A	MS-18
	Existing Bridges to Remain in Place	39-6	15.6 m plus Median Width (two lanes each direction)
			22.8 m plus Median Width (three lanes each direction)
	*Vertical Clearance (SRA Under) (9a)	39-4	MS-18
			14.4 plus Median Width
			4.5 m
	Overpassing Bridges Existing	33-5	4.3 m (9c)
			5.25 (9b) m
*Controlling design criteria (see Section 31-8).	*Vertical Clearance (SRA Over Railroad)	39-4.06	New: 7.0 m Existing: 6.6 m

**GEOMETRIC DESIGN CRITERIA FOR SUBURBAN STRATEGIC REGIONAL ARTERIALS (SRA)**  
**(New Construction/Reconstruction)**  
**(Metric)**

**Figure 46-3.E**



- (1) Level of Service. For signal timing on suburban SRA routes, provide a LOS C for the arterial through lanes, which may allow a lower level of service for the cross streets or turning lanes.
- (2) Median Width.
  - a. Raised-Curb. Where there is a U-turn demand for large trucks and undeveloped right-of-way is available, consider a median width of at least 50 ft (14.5 m) with curb and gutter.
  - b. TWTL Width. Use 14 ft (4.0 m) if there is a significant number of trucks making left turns.
- (3) Parking Lane Width. If the parking lane will be used as a travel lane or bus/HOV lane during peak hours or may be converted to a travel lane in the future, provide a 12 ft (3.6 m) width. The width of parking lane includes the gutter width.
- (4) Travel Lane Cross Slope. For the third lane away from the median, increase the cross slope by 1/16"/ft (0.5%).
- (5) Clear Zone. For curbed facilities, the horizontal clearance to an obstruction is 1.5 ft (500 mm) measured from the face of curb.
- (6) Cut Section (Uncurbed). In some cases, the initial construction of a suburban SRA may involve only providing two lanes in each direction with a shoulder and an outside ditch section. See Figure 46-3.B.
- (7) New and Reconstructed Bridge Widths. Clear roadway bridge widths are measured from face to face of outside curbs or parapet walls. Suburban bridge widths are defined as the sum of the approach traveled way width, the width of the median, and the width of gutters.
- (8) Existing Bridge Widths to Remain in Place. Clear roadway bridge widths are measured from face to face of outside curbs or parapet walls. Implies elements allowed to remain in place without a design exception approval when cost effective and when safety record is satisfactory. Sidewalks must be carried across both sides of the, bridge. Approach width shown assumes initial stage construction of only two lanes in each direction.
- (9) Vertical Clearance (SRA Under).
  - a. The clearance must be available over the traveled way and flush median.
  - b. Table value includes allowance for future overlays.
  - c. A 14 ft 0 in (4.3 m) clearance may be allowed to remain in place with consideration for reconstruction to a clearance of 14 ft 9 in (4.5 m).

**GEOMETRIC DESIGN CRITERIA FOR SUBURBAN STRATEGIC REGIONAL ARTERIALS (SRA)**  
**(New Construction/Reconstruction)**  
**(Footnotes)**

**Figure 46-3.E**

Design Element	Manual Section	Design Speed
		45 mph
* Stopping Sight Distance (1)	31-3.01	360'
Decision Sight Distance (2)	31-3.02	800'
Intersection Sight Distance (3)	36-6	500'
* Minimum Radii (4)	$e_{max} = 4\%$	715'
* Superelevation Rate (5)	48-5	$e_{max} = 4\%$
* Horizontal Sight Distance	32-4	(6)
* Vertical Curvature (K-values)	Crest	61
	Sag	79
* Maximum Grade	33-2.02	6%
Minimum Grade	33-2.03	Des: 0.5% Min: 0.3% (with Curb and Gutter)

\* Controlling design criteria (see Section 31-8)

- (1) Stopping Sight Distance. Table values are for passenger cars on level grade.
- (2) Decision Sight Distance. Table values are for the avoidance maneuver on suburban streets (speed/path/direction change).
- (3) Intersection Sight Distance. Table values are for passenger cars. See Section 36-6 for trucks.
- (4) Minimum Radii. Value shown is with a 4% superelevation rate. For a normal crown section, the minimum radius is 1040 ft.
- (5) Superelevation Rate. See Section 48-5 for superelevation rates based on  $e_{max}$ , design speed, and radii of horizontal curves.
- (6) Horizontal Sight Distance. For a given design speed, the necessary horizontal sight line offset will be determined by the radius of curve and the required sight distance.

### ALIGNMENT CRITERIA FOR SUBURBAN STRATEGIC REGIONAL ARTERIALS (SRA) (US Customary)

Figure 46-3.F

Design Element	Manual Section	Design Speed
		70 km/h
* Stopping Sight Distance (1)	31-3.01	105 m
Decision Sight Distance (2)	31-3.02	235 m
Intersection Sight Distance (3)	36-6	146 m
* Minimum Radii (4)	$e_{max} = 4\%$	203 m
* Superelevation Rate (5)	48-5	$e_{max} = 4\%$
* Horizontal Sight Distance	32-4	(6)
* Vertical Curvature (K-values)	Crest	17
	Sag	23
	Level	6%
* Maximum Grade	33-2.02	Des: 0.5% Min: 0.3% (with Curb and Gutter)
Minimum Grade	33-2.03	

\* Controlling design criteria (see Section 31-8).

- (1) Stopping Sight Distance. Table values are for passenger cars on level grade.
- (2) Decision Sight Distance. Table values are for the avoidance maneuver on suburban streets (speed/path/direction change).
- (3) Intersection Sight Distance. Table values are for passenger cars. See Section 36-6 for trucks.
- (4) Minimum Radii. Value shown is with a 4% superelevation rate. For a normal crown section, the minimum radius is 297 m.
- (5) Superelevation Rate. See Section 48-5 for superelevation rates based on  $e_{max}$ , design speed, and radii of horizontal curves.
- (6) Horizontal Sight Distance. For a given design speed, the necessary horizontal sight line offset will be determined by the radius of curve and the required sight distance.

### ALIGNMENT CRITERIA FOR SUBURBAN STRATEGIC REGIONAL ARTERIALS (SRA) (Metric)

Figure 46-3.F



## **46-4 RURAL SRA ROUTES**

### **46-4.01 General Roadway Features**

#### **46-4.01(a) General**

The recommended design for rural SRA's is to construct two or three lanes in each direction separated by a wide depressed median. The wide median will allow the addition of future through lanes in the median with minimum disruption to highway users and surrounding development. The facility may include two-way frontage roads on both sides of the mainline highway. Sufficient right-of-way should be reserved initially to allow for the recommended design. Figure 46-4.A illustrates a plan view design configuration for a rural SRA with frontage roads. Figure 46-4.B illustrates the recommended cross section for a rural four-lane SRA. Initial stage construction and bypass routes around communities would not involve the use of frontage roads. For an illustration of a superelevated section, see Figure 45-2.E.

#### **46-4.01(b) Bypass Facilities**

Many rural SRA routes are characterized by relatively lengthy segments of roadway that connect existing communities. A rural SRA route that approaches a community may better serve the concept of regional mobility if it bypasses the town. There are two options to consider for rural SRA routes at a community. One is to designate an existing highway through the town as the planned SRA route, and the other is to construct a new bypass facility. Only consider the construction of a bypass facility where there are large tracts of undeveloped land or unused rights-of-way. Also, every effort should be made to use the rights-of-way of existing roadways for the bypass alignment. As a minimum, any bypass facility should be designed with partial access control; see Chapter 45. Where full access control can be obtained, the bypass should be designed accordingly; see Chapter 44.

### **46-4.02 Geometric Design Elements**

#### **46-4.02(a) Median Types**

When providing medians on rural SRA routes, consider the following:

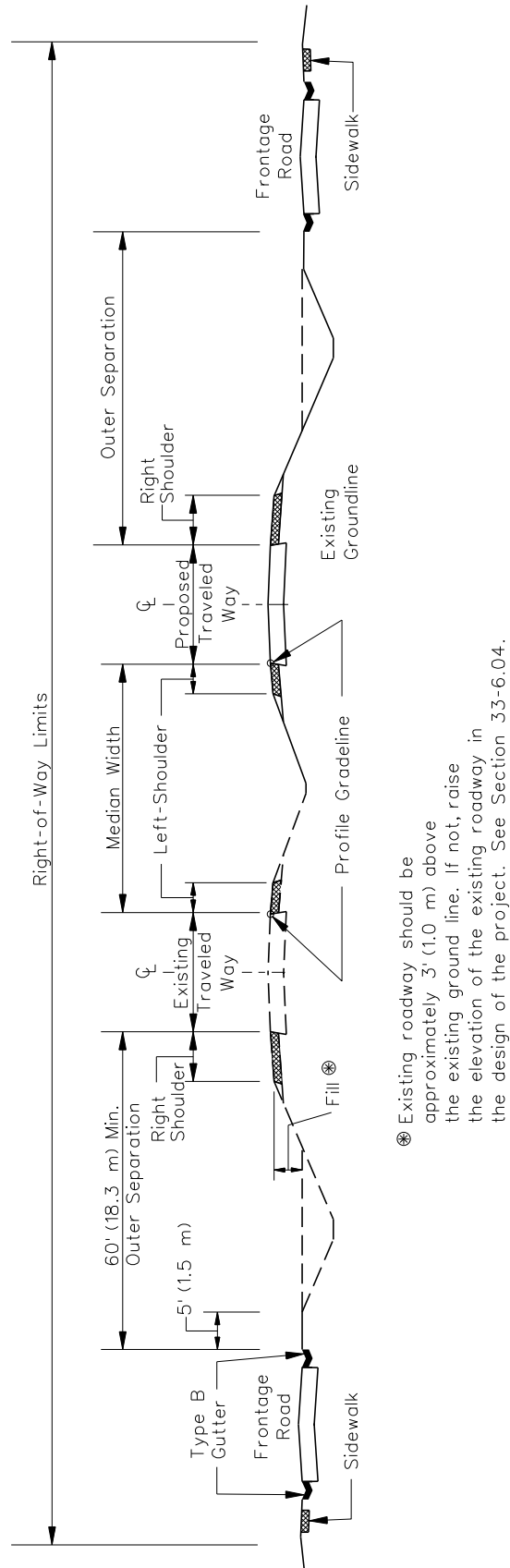
1. Type. Typically, use a depressed median on rural SRA routes. This median type will provide space for left-turning vehicles at crossroads, direct turning movements to desired locations, reduce opposing traffic conflicts, and allow for high operating speeds.
2. Width. For rural SRA routes, the minimum width is 50 ft (15 m). Where there is a high probability of need for three lanes in each direction in the future, use a 74 ft (22.2 m) wide median initially. However, where right-of-way is restricted, a 50 ft (15 m) wide median may be used initially where six lanes will be required in the future. The median can be converted to a 26 ft (7.8 m) wide median with a concrete median barrier.



**Note:** See Section 36-1.08 for selection of appropriate design vehicle.

**TYPICAL RURAL SRA ROUTE WITH FRONTAGE ROADS  
(1 mile (1.6 km) Segment)**

### Figure 46-4.A



*Note: Initial construction usually will not include frontage roads.*

**RURAL SRA CROSS SECTION**  
(Typical Design with Frontage Roads)

**Figure 46-4.B**

3. Median Crossovers. Only permit median crossovers at major intersections. Space these crossovers at intervals of 1 mile (1.5 km) or greater. Where local access to a crossroad is severely restricted or will cause significant delay for a large number of turning vehicles, crossovers may be reduced to ½ mile (800 m) intervals. However, do not use this spacing extensively along rural SRA routes. The intent of rural SRA routes is to give priority to through movements and provide for high operating speeds.
4. Flush Median with Concrete Median Barrier (CMB). This median type may be used where right-of-way is restricted; see Figure 36-3.M and Section 34-3.03.

#### **46-4.02(b) Additional Lanes**

On rural SRA routes, the desirable design is to provide sufficient right-of-way to allow two lanes in each direction with a depressed median and two-way frontage roads on each side. Where future capacity is required, a third lane can be constructed in the median.

The usual design to complete the multilane cross section is to provide a depressed median adjacent to an existing roadway and to construct a new roadway parallel to the existing lanes; see Figure 46-4.B. In some cases, it may be more appropriate to center all new construction about the centerline of the existing pavement. However, this would require all new pavements and a close examination of construction phasing for the maintenance of traffic flow.

#### **46-4.02(c) Vertical Clearances**

The vertical clearances for rural SRA routes are presented in Figure 46-4.C. Where practical on existing routes, vertical clearances may need to be increased to provide for the unrestricted movement of large vehicles. Existing bridges that do not provide a minimum of 16 ft 6 in (5.0 m) vertical clearance above the roadway are candidates for modification. Bridges which provide a vertical clearance of 16 ft 00 in (4.9 m) may remain in place, but should be considered for reconstruction or other means to achieve a minimum vertical clearance of 16 ft 6 in (5.0 m). Where the SRA route is an underpass, the recommended method to increase the vertical clearance is to lower the roadway through milling, raising the pier height, reconstructing the bridge, or other methods. Carefully evaluate potential drainage and utility problems.

#### **46-4.03 Access Management**

Sections 46-2.03 and 46-3.03 provide guidance on access management techniques that are also applicable to rural SRA routes. In addition, consider the following:

1. Frontage Roads. Because of the potential hazards introduced by intermittent access points, the most desirable form of access management is to provide two-way frontage roads along the SRA route. If the frontage roads are not constructed initially, consider providing sufficient right-of-way for incorporation of future frontage roads.



Where the frontage road is flared out at an intersection, do not allow development to occur within the interior area of the “jughandle.” This area may be an appropriate location for park-and-ride lots; see Figure 46-4.A. Protection of this area will also allow the construction of a diamond interchange in the future.

2. Minor Road Access. The high speeds on rural SRA routes can make intersections with minor side roads potentially hazardous. Signalization is not recommended due to the delays that would be created on the rural SRA route. Desirably, terminate access to the minor road at the frontage road. If this is not practical, the next option is only to allow right-in and right-out maneuvers on the SRA route.

#### **46-4.04 Intersections**

In addition to Chapter 36, the following is applicable to intersections on rural SRA routes:

1. Turn Lanes. Section 36-3 provides the warrants and design criteria for turn lanes. In addition, the following will apply:
  - a. Left-Turn Lanes. Provide tapered offset left-turn lanes at all signalized and major intersections. Use a parallel, left-turn lane design at minor road intersections where an intermediate median crossover is proposed.
  - b. Right-Turn Lanes. In general, provide right-turn lanes at all intersections.
  - c. U-Turn Crossovers. Where a crossover is required for U-turns, provide a parallel left-turn lane design into the crossover. The left-turn lane may be designed for 50 mph (80 km/h) design speed.
2. Turning Radii. Insufficient turning radii for trucks can significantly affect the capacity of an intersection. Design the right- and left-turning radii to meet the expected design vehicle. Intersection design vehicles and truck routes are discussed in Section 36-1.08.
3. Channelization. To reduce the wide expanses of intersections, use corner islands to direct the flow of right-turning vehicles through the intersection. Channelization also can be effective at intersections where approaches are not at or close to 90° angles. At these locations, channelization and corner islands can help guide motorists through unusual turning movements. Section 36-3 illustrates typical design features that should be used at rural SRA intersections.
4. New Intersections. Where new local roads are proposed, restrict them to right-in/right-out movements. The depressed median will restrict left-turn movements from the SRA to the local road, left-turn movements from the local road to the SRA, and through movements on the local road across the SRA. However, alternative routes and emergency vehicular response times must also be evaluated and may result in the design of a median crossover. When frontage roads are provided, remove these minor roads from the SRA route and tee them into the frontage road; see Figure 46-4.A.

5. Intersection Lighting. All major intersections should have appropriate intersection lighting. See Chapter 56 for information on highway lighting.

#### **46-4.05 Railroad Grade Separations**

Where there is one or more trains per day crossing a rural SRA, consider providing for a future structure over the railroad. The feasibility of this type of improvement is dependent upon projected traffic volumes, roadway characteristics, posted speed, duration and volume of rail movements, and the amount of right-of-way available for overpass construction. Right-of-way should be protected at all rural SRA routes that will cross railroads at-grade.

In general, do not provide a grade-separation structure for frontage roads adjacent to the rural SRA route. Instead, flare the frontage roads out an appropriate distance from SRA grade-separation structure so that sight lines along the tracks are not blocked by the embankment and structure.

#### **46-4.06 Interchanges**

Right-of-way should be protected at all major intersections with rural SRA routes for eventual interchange construction. This will help to eliminate most signalized intersections and improve safety and mobility. Right-of-way is typically available at rural SRA crossroads to construct a diamond interchange; see Chapter 37. Where right-of-way is restricted, consider using a single point urban diamond or compressed diamond interchange. Figure 46-4.A shows the typical design of how frontage roads are flared out at major intersections initially, and how they might be incorporated into an interchange design.

If two intersecting rural SRA routes have unusually high projected traffic volumes and where sufficient right-of-way is available, consider providing a cloverleaf interchange design. The projected level of service on both routes should be level D or lower with conventional improvements before this option is considered. The route with the highest projected volumes should be considered to have the priority movement. The crossover of the lower priority route should have a design speed of 60 mph (100 km/h) through the interchange.

All rural SRA interchanges should have lighting. However, lighting should not create “light pollution” problems from spillover into nearby residential areas.

#### **46-4.07 Drainage**

On rural SRA routes, open ditches will be used to accommodate roadway drainage. Design of ditches and drainage appurtenances must meet the criteria in the *IDOT Drainage Manual*. Outside ditches should be at least 6 ft (1.8 m) wide to provide for extra detention storage and adequate clear zone.

#### **46-4.08 Frontage Roads**

Frontage roads may be appropriate along rural SRA routes to separate slower local traffic from the higher speed through traffic on the SRA route and to reduce the number of conflict points. The most desirable option is to provide two-way frontage roads on both sides of the rural SRA route. Direct access to the SRA route should only occur at major crossroad intersections. Design criteria for frontage roads are presented in Chapter 44. Between major intersections, the total SRA right-of-way should be approximately 300 ft to 350 ft (90 m to 100 m). At intersections, flare the frontage road out approximately 400 ft (125 m) to create separate intersections on the crossroad between the frontage road and the rural SRA; see Figure 46-4.A. This spacing will also allow for signal coordination.

#### **46-4.09 Traffic Control Devices**

##### **46-4.09(a) Traffic Signals**

Provide fully actuated traffic signals at all signalized intersections on rural SRA routes. Chapter 57 and the Bureau of Operations *Policies and Procedures Manual* provide additional information on traffic signals.

##### **46-4.09(b) Overhead Signing**

All rural SRA-to-SRA route intersections should have advance overhead signing with route numbers and/or road names and, where appropriate, regional destinations. The lettering should be large enough to read at a distance of 400 ft to 500 ft (125 m to 150 m).

##### **46-4.09(c) Stop Sign Removal**

Stop sign control for traffic movements on an SRA route is inconsistent with giving priority to the SRA through movement. Therefore, remove all stop signs from the through lanes of a rural SRA route. However, it will be necessary to conduct a traffic engineering study to determine the appropriate traffic control at the location for both the SRA route and the intersecting crossroad.

##### **46-4.09(d) Pavement Markings**

Because of their durability and visibility, only use high-type pavement markings on rural SRA routes. High-type pavement markings include thermoplastic, epoxy, and pre-formed plastics. Include raised pavement markers and delineators on rural SRA routes. Raised pavement markers introduce an element of safety to the SRA route during inclement weather. Space raised pavement markers and delineators according to the Bureau of Operations *Policies and Procedures Manual* and the *IDOT Highway Standards*.

#### **46-4.10 Transit**

##### **46-4.10(a) Improvements**

Techniques associated with mass transit that may be applicable in certain rural situations are described in Section 46-2.11. For rural areas, it will also be necessary to improve transit station accessibility as discussed in Section 46-3.11. Ridesharing is a common approach to transit in rural areas. The “jughandle” design of the frontage road at major crossroad intersections typically provides adequate locations for park-and-ride facilities; see Figure 46-4.A.

##### **46-4.10(b) Express Bus Service**

Bus service on rural SRA routes should be limited to express buses that are equipped with priority signal preemption capability that can be deployed when they are running behind schedule. However, coordinate the bus preemption with existing vehicular progression along the SRA route. Bus stop locations generally should be located off the rural SRA route on side roads or park-and-ride lots. Space these stops at approximately 5 mile (8 km) intervals. Where it is impractical to locate bus stops off the SRA route, design bus turnouts and stops according to the criteria in Chapter 58.

#### **46-4.11 Pedestrians and Bicyclists**

The criterion for pedestrians and bicyclists presented in Section 46-3.13 is also applicable for rural SRA routes.

#### **46-4.12 Environmental Considerations**

The environmental analysis component of the SRA planning process is primarily an inventory of existing conditions. The inventory identifies those environmental resources in the corridor and probable impacts based on roadway improvements. Environmental assessments will be performed during the Phase I design work. These are discussed in Part III “Environmental Procedures” of this *Manual*.

#### **46-4.13 Right-of-Way**

Section 46-3.15 provides guidance for protecting future right-of-way needs which is also applicable to rural SRA routes. Also Section 4-510 of the *Illinois Highway Code* provides guidance on the use of protective right-of-way buying as it applies to existing alignments.

#### **46-4.14 Tables of Design Criteria**

Figure 46-4.C presents the Department’s design criteria for new construction and reconstruction of rural strategic regional arterial projects. Figure 46-4.D presents the alignment of criteria for

rural SRA routes. The designer should realize that some of the cross section elements included in the figure (e.g., flush median with concrete barrier) are not automatically warranted in the project design. The values in the figure only apply after the decision has been made to include the element in the highway cross section.

Design Element			Manual Section	Desirable Design Values
Design Controls	Design Forecast Year		31-4.02	20 Years
	* Design Speed		31-2	60 mph
	Access Control		35-1	Managed Access (1)
	Level of Service		31-4.04	C
	On-Street Parking		—	Not Allowed
Cross Section	Traffic Signals		46-4.09	Spaced at 1 mile increments
	* Traveled Way Width		34-2.01	Initial: 2 @ 24' (2) Recommended: 2 @ 36'
	* Shoulder Width	Right	34-2.02	10'
		Paved		10'
		Total Width		6' (3)
	Auxiliary Lanes	Left	34-2.03	4'
		Lane Width		Single Left & Right: 12'
		Shoulder Width		4' (Paved)
	Median Width	Depressed	34-3	Minimum: 50'
		Flush (Concrete Barrier)		22' (4)
		TWLT		N/A
	Parking Lane Width		46-4.06	N/A
	Bicycle Lane Width		48-2.05	N/A
	Cross Slope	* Travel Lane	46-4.11	Use 10' Paved Shoulder
		Shoulder	34-2.01	3/16"/ft for Lanes Adjacent to Crown (5)
Roadway Slopes	Sidewalk Width		34-2.02	12"/ft
	Clear Zone		58-1.06	5' Adjacent to Frontage Road with 5' Buffer Strip
	Side Slopes		38-3	(6)
		Front Slope	34-4.03	1V:4H
		Ditch Width		6' (7)
	Median Slopes	Back Slope	34-4.05	1V:3H (8)
		Rock Cut		—
		Fill Section	34-4.02	1V:4H to Clear Zone; 1V:3H max. to Toe of Slope (9)
	New and Reconstructed Bridges	Depressed	34-3.03	1V:6H or 1V:5H
		Flush		12"/ft
Bridges	Existing Bridges to Remain in Place	* Structural Capacity	N/A	HS-20
		* Clear Roadway Width (10)	39-6	38' - 40'
		* Structural Capacity	N/A	HS-20
	* Vertical Clearance (SRA Under) (12a)	* Clear Roadway Width (11)	39-6	34' with 22' Traveled Way
		New and Replaced Overpassing Bridges (12b)	39-4	16'-6"
		Existing Overpassing Bridges	33-5	16'-0"
	* Vertical Clearance (SRA Over Railroad)	Overhead Signs/Pedestrian Bridges		17'-3" (12b)
			39-4.06	New: 23'-0" Existing: 21'-6"

\* Controlling design criteria (see Section 31-8).

**GEOMETRIC DESIGN CRITERIA FOR RURAL STRATEGIC REGIONAL ARTERIALS (SRA)**  
**(New Construction/Reconstruction)**  
**(US Customary)**

Figure 46-4.C

Design Element			Manual Section	Desirable Design Values
Design Controls	Design Forecast Year		31-4.02	20 Years
	* Design Speed		31-2	100 km/h
	Access Control		35-1	Managed Access (1)
	Level of Service		31-4.04	C
	On-Street Parking		—	Not Allowed
Cross Section	Traffic Signals		46-4.09	Spaced at 1.6 km increments
	* Traveled Way Width		34-2.01	Initial: 2 @ 7.2 m (2) Recommended: 2 @ 10.8 m
	* Shoulder Width	Right	34-2.02	3.0 m
		Total Width Paved		3.0 m
	Auxiliary Lanes	Left	34-2.02	1.8 m (3)
		Total Width Paved		1.2 m
	Median Width	Lane Width	34-2.03	Single Left & Right: 3.6 m
		Shoulder Width		1.2 m (Paved)
		Depressed		Minimum: 15 m
Roadway Slopes	Cross Slope	Flush (Concrete Barrier)	34-3	7.0 m (4)
		TWLT	46-4.06	N/A
	Parking Lane Width		48-2.05	N/A
	Bicycle Lane Width		46-4.11	Use 3.0-m Paved Shoulder
	Shoulder	* Travel Lane	34-2.01	1.5% for Lanes Adjacent to Crown (5)
		Shoulder	34-2.02	4%
	Sidewalk Width		58-1.06	1.5 m Adjacent to Frontage Road with 1.5-m Buffer Strip
	Clear Zone		38-3	(6)
	Side Slopes	Cut Section	34-4.03	1V:4H
		Ditch Width		1.8 m (7)
		Back Slope		1V:3H (8)
Bridges	Median Slopes	Rock Cut	34-4.05	—
		Fill Section	34-4.02	1V:4H to Clear Zone; 1V:3H max. to Toe of Slope (9)
		Depressed		1V:6H or 1V:5H
	New and Reconstructed Bridges	Flush	34-3.03	4%
		* Structural Capacity	N/A	MS-18
		* Clear Roadway Width (10)	39-6	11.4 m - 12.0 m
	Existing Bridges to Remain in Place	* Structural Capacity	N/A	MS-18
		* Clear Roadway Width (11)	39-6	10.2 m with 6.6-m Traveled Way
		New and Replaced Overpassing Bridges (12b)	39-4	5.0 m
	* Vertical Clearance (SRA Under) (12a)	Existing Overpassing Bridges		4.9 m
Bridges	* Vertical Clearance (SRA Over Railroad)	Overhead Signs/Pedestrian Bridges	33-5	5.25 m (12b)
			39-4.06	New: 7.0 m Existing: 6.6 m

\* Controlling design criteria (see Section 31-8).

# **GEOMETRIC DESIGN CRITERIA FOR RURAL STRATEGIC REGIONAL ARTERIALS (SRA)** **(New Construction/Reconstruction)** **(Metric)**

Figure 46-4.C

- (1) Access Management. Direct access to the SRA route will be controlled by future two-way frontage roads. Where bypass routes are proposed around communities, the bypass desirably should be fully access controlled or, at a minimum, partially access controlled.
- (2) Traveled Way Width. Existing 22 ft (6.6 m) width may remain in place.
- (3) Left Shoulder Width. Consider providing a 8 ft (2.4 m) shoulder width and 1V:5H median slopes where level of service is approaching "C."
- (4) Flush Median Width. Only use flush medians with CMB where right-of-way or topography restricts the use of a depressed median. Consider providing wider medians where required for snow storage.
- (5) Travel Lane Cross Slope. For the additional lane away from the crown lanes, increase the cross slope by 1/16"/ft (0.5%).
- (6) Clear Zone. The clear zone will vary according to design speed, traffic volumes, side slopes, and horizontal curvature. For restricted right-of-way conditions, see Figure 34-4.D.
- (7) Ditch Width. Provide a wider outside ditch where detention storage of storm water is a consideration.
- (8) Back Slope. Where the height of cut exceeds 10 ft (3 m), consider using a 1V:2H back slope beyond the clear zone. Also, for heights greater than 30 ft (9 m), consider the use of benching.
- (9) Fill Slope. For fill heights greater than 30 ft (9 m), use a 1V:2H uniform slope with a roadside barrier along the shoulder. Also, for fill heights greater than 30 ft (9 m), consider the use of benching.
- (10) New and Reconstructed Bridge Widths. Clear roadway bridge widths are measured from face to face of parapets or rails. Bridge widths are normally defined as the sum of the approach traveled way width and the width of the paved shoulders.
- (11) Existing Bridge Widths to Remain in Place. Clear roadway bridge widths are measured from face to face of parapets or rails. Implies elements allowed to remain in place without a design exception approval when cost effective and when safety record is satisfactory.
- (12) Vertical Clearance (SRA Under).
  - a. The clearance must be available over the traveled way and any paved shoulders.
  - b. Table value includes allowance for future overlays.

## GEOMETRIC DESIGN CRITERIA FOR RURAL STRATEGIC REGIONAL ARTERIALS (SRA) (New Construction/Reconstruction)

Footnotes to Figure 46-4.C



Design Element	Manual Section	Desirable Speed
		60 mph
* Stopping Sight Distance (1)	31-3.01	570'
Decision Sight Distance (2)	31-3.02	990'
Intersection Sight Distance (3)	36-6	665'
* Minimum Radii	32-2.03	1330'
* Superelevation Rate (4)	32-3	$e_{\max} = 6\%$
* Horizontal Sight Distance	32-4	(5)
* Vertical Curvature (K-values)	Crest	151
	Sag	136
* Maximum Grade (6)	Level	3% New Construction
	Rolling	4% New Construction
Minimum Grade	33-2.03	0.5% Minimum 0.0% (with Special Ditching)

\* Controlling design criteria (see Section 31-8)

- (1) Stopping Sight Distance. Table values are for passenger cars on level grades.
- (2) Decision Sight Distance. Table values are for the avoidance maneuver on rural road (speed/path/direction change).
- (3) Intersection Sight Distance. Table values are for passenger cars turning right or left from a stopped condition. A wide median is assumed on the rural SRA for left turns from the crossroad. See Section 36-6 for trucks.
- (4) Superelevation Rate. See Section 32-3 for superelevation rates based on  $e_{\max}$ , design speed, and radii of horizontal curves. For horizontal curves to remain in place, an  $e_{\max}$  of 8% may be considered to remain in place for a design speed of 60 mph. Where a crossroad intersection lies within the limits of a horizontal curve, see Figure 36-1.D for the maximum superelevation rates allowed on the SRA curve.
- (5) Horizontal Sight Distance. For a given design speed, the necessary horizontal sight line offset will be determined by the radius of curve and the required sight distance.
- (6) Maximum Grades. For existing roadways to remain in place, a maximum of +4% on upgrades and -5% on downgrades may be retained.

### ALIGNMENT CRITERIA FOR RURAL STRATEGIC REGIONAL ARTERIALS (SRA) (US Customary)

Figure 46-4.D

Design Element	Manual Section	Desirable Speed
* Stopping Sight Distance (1)	31-3.01	100 km/h
Decision Sight Distance (2)	31-3.02	185 m
Intersection Sight Distance (3)	36-6	315 m
* Minimum Radii	32-2.03	209 m
* Superelevation Rate (4)	32-3	437 m
* Horizontal Sight Distance	32-4	$e_{max} = 6\%$
* Vertical Curvature (K-values)	Crest	(5)
	Sag	52
* Maximum Grade (6)	Level	45
	Rolling	3% New Construction
Minimum Grade	33-2.02	4% New Construction
	33-2.03	0.5% Minimum 0.0% (with Special Ditching)

\* Controlling design criteria (see Section 31-8)

- (1) Stopping Sight Distance. Table values are for passenger cars on level grades.
- (2) Decision Sight Distance. Table values are for the avoidance maneuver on rural road (speed/path/direction change).
- (3) Intersection Sight Distance. Table values are for passenger cars turning right or left from a stopped condition. A wide median is assumed on the rural SRA for left turns from the crossroad. See Section 36-6 for trucks.
- (4) Superelevation Rate. See Section 32-3 for superelevation rates based on  $e_{max}$ , design speed, and radii of horizontal curves. For horizontal curves to remain in place, an  $e_{max}$  of 8% may be considered to remain in place for a design speed of 100 km/h. Where a crossroad intersection lies within the limits of a horizontal curve, see Figure 36-1.D for the maximum superelevation rates allowed on the SRA curve.
- (5) Horizontal Sight Distance. For a given design speed, the necessary horizontal sight line offset will be determined by the radius of curve and the required sight distance.
- (6) Maximum Grades. For existing roadways to remain in place, a maximum of +4% on upgrades and -5% on downgrades may be retained.

## ALIGNMENT CRITERIA FOR RURAL STRATEGIC REGIONAL ARTERIALS (SRA) (Metric)

Figure 46-4.D

**46-5 REFERENCES**

1. *A Policy on Geometric Design of Highways and Streets*, AASHTO, 2011.
2. *Strategic Regional Arterial: Design Concept Report*, IDOT, February 1994.
3. SRA Access Management Policy, District 1 Bureau of Traffic, IDOT, 1998.
4. *Guide for the Design of High Occupancy Vehicle Facilities*, AASHTO, 2004.

